VTM-2000

Multi-Format SD-SDI Monitor
Installation and Operation Handbook

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243 Shoemaker Road
Pottstown, PA 19464-6433

OPERATOR'S SAFETY SUMMARY

CAUTION — these instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

To ensure safety:

- The unit should not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the unit.
- When the unit is to be permanently cabled, connect the protective ground conductor *before* making any other connections.
- Operate built-in units only when they are properly fitted into the system.
- For permanently cabled units without built-in fuses, automatic switches, or similar protective facilities, the AC supply line must be fitted with fuses rated to the units.
- Before switching on the unit, ensure that the operating voltage set at the unit matches the line voltage, if appropriate. If a different operating voltage is to be set, use a fuse with the appropriate rating. Refer to the Installation Instructions.
- Units of Protection Class I with an AC supply cable and plug that can be disconnected must be operated only from a power socket with protective ground contact:
  - Do not use an extension cable—it can render the protective ground connection ineffective.
  - Do not intentionally interrupt the protective ground conductor.
  - Do not break the protective ground conductor inside or outside the unit or loosen the protective ground connection; such actions can cause the unit to become electrically hazardous.
- Before opening the unit, isolate it from the AC supply. Then ensure that:
  - Adjustments, part replacements, maintenance, and repairs are carried out by qualified personnel only.
  - Safety regulations and rules are observed to prevent accidents.
  - Only original parts are used to replace parts relevant to safety (for example, the power on/off switches, power transformers, and fuses).
- Replaceable fuses can be hazardous when live. Before replacing a fuse, disconnect the AC power source.
- Use caution when cleaning the equipment; isopropyl alcohol or similar solvents can damage or remove the labels.
- Observe any additional safety instructions specified in this manual.

These symbols may appear on Videotek equipment:

Explanation of Symbols

Read the *Operator's Handbook* or the *Service and Instruction Manual* and observe the safety symbols used.

Unit ground

Caution: shock hazard

Equipotentiality

Protective ground connection

Ground

European Restriction on Hazardous Substance (RoHS), and Waste from Electrical and Electronic Equipment (WEEE) Compliance

About This Document

This document provides information concerning Leitch Technology International, Inc. compliance with EU Directive 2002/95/EC and EU Directive 2002/96/EC.

Restriction on Hazardous Substances (RoHS) Directive

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive takes effect on July 1, 2006, and it refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

In accordance with this EU Directive, all Leitch Technology products sold in the European Union will be fully RoHS-compliant and “lead-free.” (See the Leitch Web site, www.leitch.com, for more information on dates and deadlines for compliance.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Leitch equipment that complies with the EU directive will be marked with a RoHS-compliant symbol, as shown in Figure 1.

Figure 1. RoHS Compliance Symbol

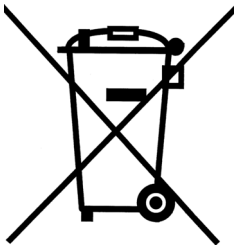
WASTE FROM ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) DIRECTIVE

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. Effective August 13, 2005, producers or users will be required to recycle electrical and electronic equipment at end of its useful life, and must not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, Leitch Technology International, Inc. and other companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled.

(See the Leitch Web site, www.leitch.com, for more information on dates and deadlines for compliance.) Contact your local Leitch sales representative for information on returning these products for recycling. Leitch equipment that complies with the EU directive will be marked with a WEEE-compliant symbol, as shown in Figure 2.

Figure 2. WEEE Compliance Symbol



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Section 1 ♦ Introduction

The Videotek VTM-2000 is a Muti-format On-Screen Monitor with waveform monitor, vectorscope, picture, and alarm status. It is a 19" rackmounted unit that accepts two NTSC or PAL composite video signals, two SD-SDI video signals, and an external analog reference video signal. The display presents the image carried by the selected video input as a real-time, full-motion picture. Front panel user controls allow for various display and selection modes.

In addition, the VTM-2000 also accepts the audio option VTM-A^3-OPT 1, which is the Advanced Audio Analysis Option with bargraphs and lissajous. With the VTM-A^3-OPT 1 up to four audio channels can be viewed simultaneously. There are two analog stereo inputs, four AES/EBU inputs, and 16 channels of embedded audio. It also contains analog monitoring outputs of up to four channels simultaneously.

The VTM-2000 seamlessly integrates into any broadcast, post-production, camera maintenance, satellite or cable facility, and is the ultimate choice for quality control, troubleshooting, or compliance checking applications.

*US Patents 6,069,607, 6,532,024, and 6,828,981. UK Patent 2,330,475. Other US and foreign patents pending.

Features include:

- Dual SD-SDI inputs with auto detection
- Dual composite analog inputs with auto detection
- Reference input
- XGA, High Resolution, output
- Three user presets and one factory preset
- Compact 1RU configuration
- Input standards: SMPTE 259M-C, NTSC, and PAL

Video Standards Supported

The VTM-2000 supports the following video standards:

For SD:

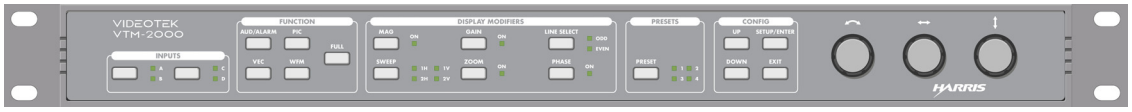
- 525/59.94
- 625/50

For analog:

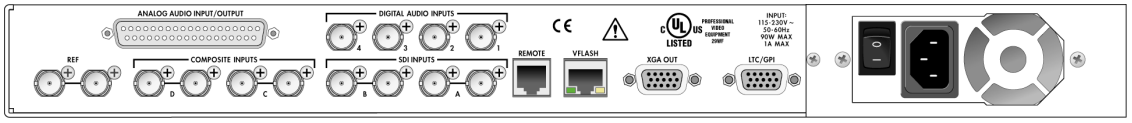
- NTSC
- PAL

The VTM-2000 front and back panels are illustrated in **Figure 1-1**.

Figure 1-1. VTM-2000 Front and Back Panels



Front Panel



Back Panel

Service and Support

For service support, telephone the Customer Service Department at **610-327-2292**. If the problem cannot be resolved over the telephone and the instrument must be shipped to Videotek for service or repair:

- Obtain a Return Authorization (RA) number from the Videotek Customer Service Department.
- Attach a tag to the unit with:
  - Your company name, address, and telephone number
  - The name of the contact person at your company
  - The RA number
  - The unit serial number
  - An explanation of the problem
- To prevent shipping damage, pack the unit the same way Videotek had packed it. If possible, use the original packing materials in the original shipping container.
- Ship the unit to:

  Videotek, Inc.
  243 Shoemaker Road
  Pottstown, PA 19464-6433
  Attn: Service Dept.

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Section 2 ♦ Installation

This section provides information about inspecting, installing, and configuring the VTM-2000.

Inspecting the Shipment

Before installing the VTM-2000, inspect the box and the contents. Report any damage to the shipper and telephone the Videotek Customer Service Department for service and support (see Section 1, "Service Support").

NOTE: Refer to the enclosed packing sheet for the latest list of items that are supplied with the unit.

The box contains the following:

- One VTM-2000
- One *VTM-2000 Installation and Operation Handbook*
- One 75Ω terminator
- One detachable power cord
- One breakout connector (for LTC/GPI)
- If the audio option has been purchased, one additional breakout connector or 37-pin connector is also supplied

Save the box and packing material for any future shipping requirements.

Rack Mounting the VTM-2000

When selecting the permanent mounting location for the VTM-2000, ensure that the flow of air to the ventilation holes on the sides of the chassis is not obstructed. Rack mounting the VTM-2000 is illustrated in **Figure 2-1**. The parts required to rack mount the VTM-2000 are listed in **Table 2-1**.

Figure 2-1. Mounting the VTM-2000 in a Rack

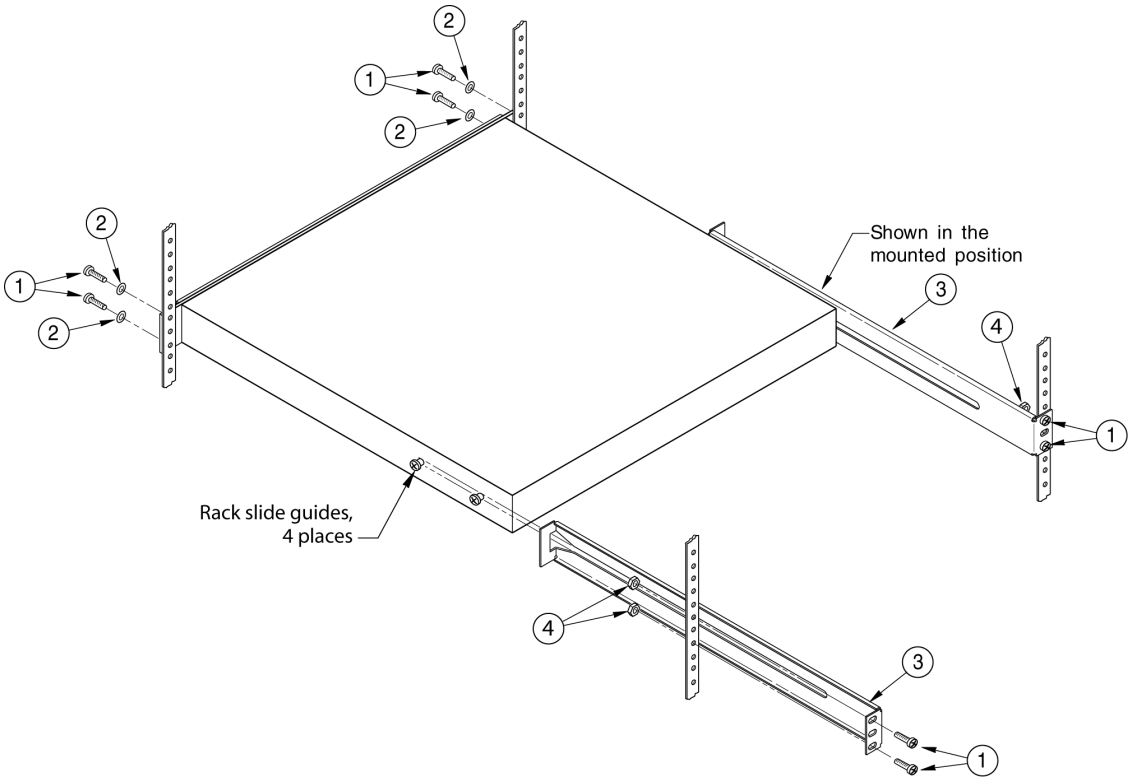


Table 2-1. Parts Required to Rack Mount the VTM-2000 using the DRC-2

Key	Item Number	Quantity	Description
1	831030	8 (4 for each side)	Hardware screw, 10-32 x 3/4 PP black
2	831019	4 (2 for each side)	Hardware washer, nylon, .437 x .195 x .032
3	832076	2 (1 for each side)	Metal rack extension bracket
4	831060	4 (2 for each side)	Hardware knut 10-32

Attach the rack extension brackets to the back of the rack. Once the extension brackets are in place, guides on the VTM-2000 unit enable it to slide in and out of rack extension brackets for easy access and removal.

Connecting the VTM-2000

The back panel connectors are illustrated in **Figure 2-2**, and the function of each connector is described in **Table 2-2**.

Figure 2-2. VTM-2000 Back Panel Connectors

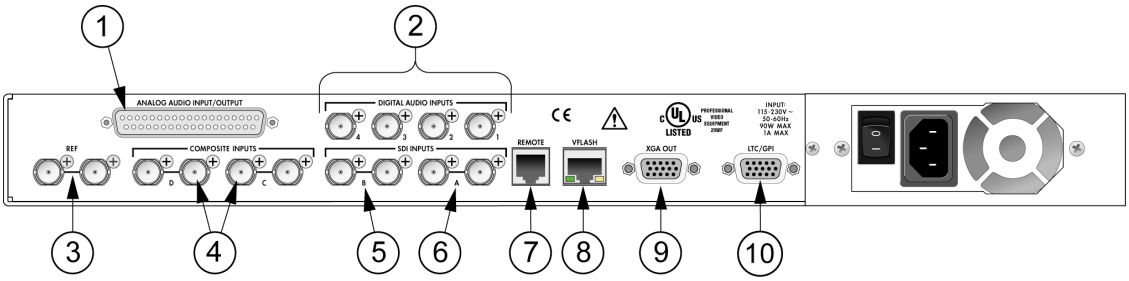


Table 2-2. Description of Back Panel Connectors

Key	Label	Description
1	ANALOG AUDIO IN/OUT	Optional 37-pin, D-sub, male connector for analog audio inputs and outputs. The supplied breakout board can be used for solderless connections.*
2	DIGITAL AUDIO INPUT 1, 2, 3, 4	Optional female BNC connectors for AES/EBU audio input.
3	REF	Female BNC connectors that connect to an external NTSC/PAL reference signal (video or blackburst) from which the horizontal and vertical sync, and the color burst frequency for the VTM-2000 will be derived if EXT has been selected as the REF source. If these connectors are not looped through, then the unused connector must be terminated at 75Ω.
4	INPUTS C (IN, OUT), D (IN, OUT)	Female BNC looping analog composite input and output connectors. Termination required.
5	INPUT B (IN, OUT)	Female BNC looping SD SDI input and output connector. Termination required.
6	INPUT A (IN, OUT)	Female BNC looping SD SDI input and output connector. Termination required.
7	REMOTE	RJ11 socket to connect to the remote control panel.*
8	VFlash	RJ45, female, 10/100 BaseT Ethernet connection to be used with a PC running the VFlash program.*
9	XGA OUT	15-pin, high-density, female, D-sub connector for XGA output.*
10	LTC/GPI	15-pin, high-density, female, D-sub connector for LTC, and GPI input.*

*See Appendix C, "Pinouts," for the connections.

Ethernet Setup

1. Prior to the VTM-2000 Network configuration, obtain Transmission Control Protocol/Internet Protocol (TCP/IP) addresses from the System Administrator or from the Internet Service Provider (ISP).

   These addresses are:

   - A static IP address (unless Dynamic Host Configuration Protocol (DHCP) will be used)
   - A Subnet Mask
   - An optional Gateway IP

   Be sure to record all addresses. The Gateway address is only needed if the VTM-2000 is routed to an outside network.

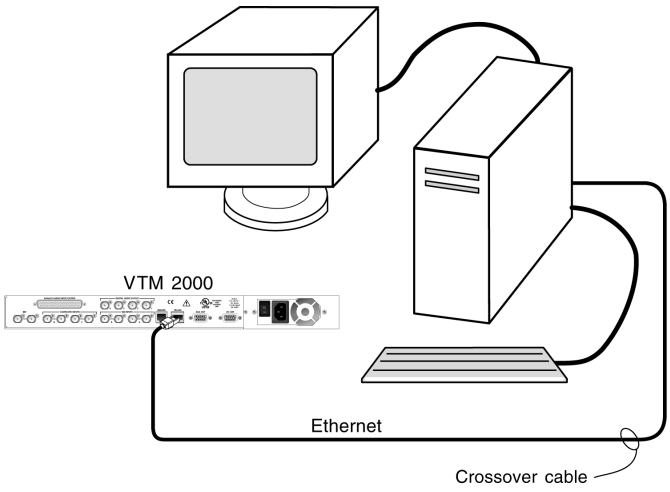
   Record the addresses:

VTM-2000 Interface Static IP Address	
VTM-2000 Interface Subnet Mask	
Gateway IP Address	

2. Identify a host PC to configure and test the VTM-2000.

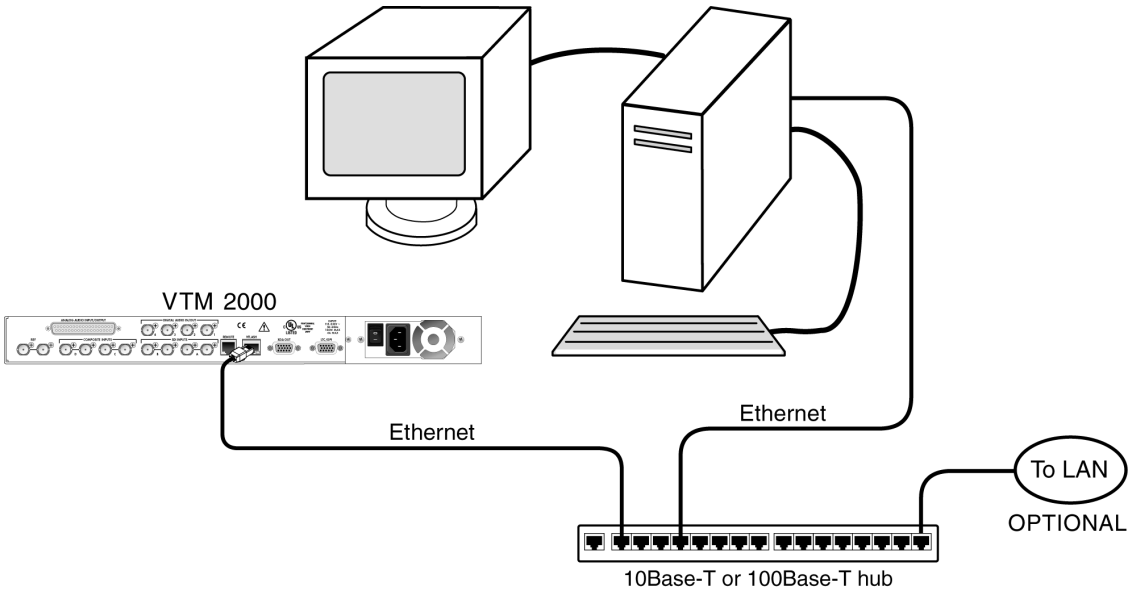
3a. For a dedicated PC connection, connect the host PC with a network card to the "VFLASH" connector on the back panel of the VTM-2000, using a CAT5 crossover cable (not included). See **Figure 2-3**.

Figure 2-3. VTM-2000 Dedicated PC Connection



3b. For a network connection, connect the network hub to the back panel of the VTM-2000 using a CAT5 network cable (not included). See **Figure 2-4**.

Figure 2-4. VTM-2000 Network PC Connection



4. Ethernet Configuration

   a) Press the SETUP/ENTER button on the VTM front panel.

   b) Press the UP or DOWN button to highlight the COMMUNICATIONS menu, and then press the SETUP/ENTER button to enter the submenu.

   c) Press the UP or DOWN button until the IP CONFIGURATION submenu is highlighted.

   d) Press the SETUP/ENTER button to enter the IP CONFIGURATION submenu.

   e) (If using DHCP) Turn the LEFT/RIGHT knob or press the SETUP/ENTER button to highlight DHCP. Press the UP or DOWN button to toggle the state to ON. Turn the LEFT/RIGHT knob or press the SETUP/ENTER button to highlight ACCEPT, and then press SETUP/ENTER. The IP Address, Subnet mask, and Gateway is retrieved from the DHCP server.

      (If not using DHCP) Press the UP or DOWN button to change the value in the first IP address box, and press the SETUP/ENTER button to highlight the next value. Repeat for the remainder of the IP Address, Subnet Mask, and Gateway. To avoid conflicts, the static IP Address, Subnet Mask, and Gateway should be obtained from the System Administrator.

   f) Press SETUP/ENTER button or turn the LEFT/RIGHT knob to highlight ACCEPT, and press SETUP/ENTER to accept the entered values.

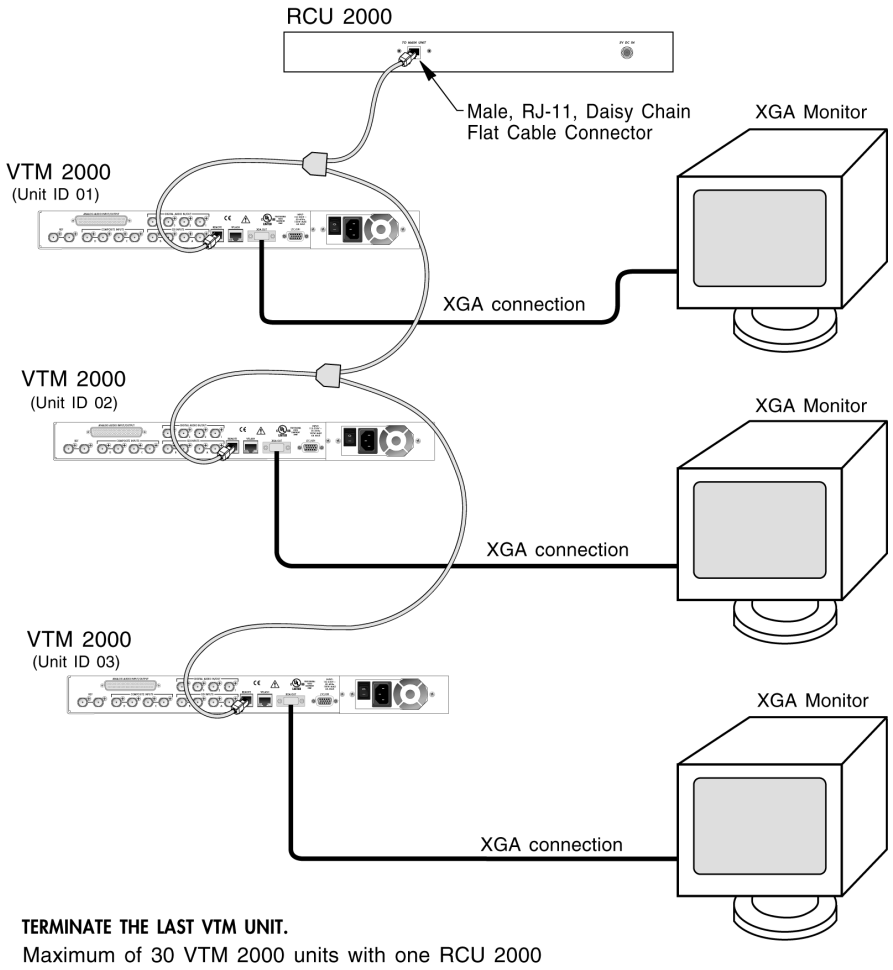
   g) Press the EXIT button to exit the submenu.

Configuring the VTM/TVM Series with the RCU-2000 Remote Control

For the following configurations, the interconnecting cables can be extended using electronic distribution. There are two ways to configure the VTM-2000 Series with the RCU-2000 remote control:

- One RCU-2000 connected to one VTM-2000 unit using the REMOTE port.
- One RCU-2000 connected to multiple VTM-2000 using a multidrop cabling adaptor and straight through cable using RJ-11 connectors (not a standard telephone wire) that connects to the REMOTE ports on the back of the VTM-2000 units and to the TO MAIN UNIT connector on the back of the RCU. All VTM-2000 units must have unique unit IDs. The unit ID is the identification number of the VTM-2000 units, and can be set to any number within a range of 1 to 99 in the COMMUNICATIONS menu. The unit IDs should be different than the identification numbers of other units in the same system configuration. The REMOTE port must be terminated on the last VTM-2000 unit, as shown in **Figure 2-5**. The flat cable shown in **Figure 2-5** is a straight through cable.

Figure 2-5. Connecting the RCU-2000 Remote Control Panel to Multiple VTM-2000 Units



Section 3 ♦ General Operation

Terms

Pane: One quadrant in a four-quadrant screen.

Display: The output that appears on the XGA monitor.

Quad: Screen that contains four panes.

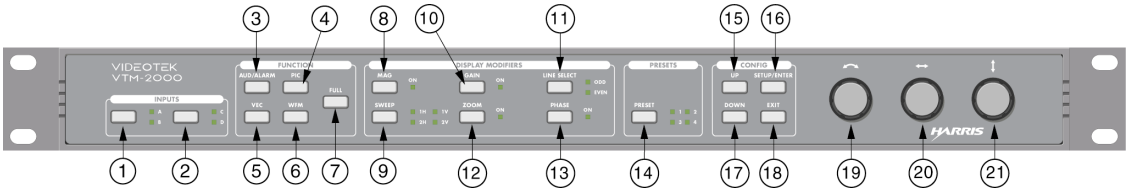
Full: Full-screen display of the selected pane (non quad).

Introduction to Operating the VTM-2000

The VTM-2000, shown in **Figure 3-1** and described in **Table 3-1,** can display four panes on the screen, in standard quad mode each of which provides a fixed display of waveform (lower-right), vector (lower-left), audio and alarm status (upper-left), and picture (upper-right). A sample quad screen with the lower-right pane selected is shown in **Figure 3-2**.

Certain buttons function differently according to the selected pane. Once the pane is selected, more detailed settings can be configured. This section focuses on the operation of the VTM-2000 according to the selected display.

Figure 3-1. VTM-2000 Front Panel*



***NOTE**: Pressing and holding some of the function buttons will activate menus for additional functionality.

Table 3-1. Front Panel Description

Key	Label	Description
1	**INPUTS A and B**	Press to select SDI input A or SDI input B.
2	**INPUTS C and D**	Press to select composite input C or composite input D.
3	**AUDIO/ALARM**	Press to highlight and switch between the Audio and Alarm pane. When audio is installed, the Audio pane is the default pane.
4	**PIC**	Press to highlight the Picture pane
5	**VEC**	▪ Press to highlight the Vector pane ▪ Press and hold to access the Vector Pane menu.
6	**WFM**	▪ Press to highlight the Waveform pane ▪ Press and hold to access the Waveform Pane menu.
7	**FULL**	Press to show a full-screen display of the selected pane.

(Table continues on next page)

Table 3-1. Description of Front Panel Controls Illumination (*continued*)

Key	Label	Description
8	MAG	Press to cycle through the magnifications for the waveform display, either a normal horizontal sweep or a sweep that has been horizontally magnified. The magnifications are shown below: ▪ Component 1H Sweep magnifications: 15.0 µS, 3.0 µS, and 1.5 µS ▪ Component 1V Sweep magnifications:15.0 ms, 3.0 ms, 1.5 ms, and 0.6 ms ▪ Composite 1H Sweep magnifications: 5.0 µS, 1.0 µS, 0.5 µS ▪ Composite 2H Sweep magnifications: 10.0 µS, 2.0 µS, 1.0 µS ▪ Composite 1V Sweep magnifications: 5.0 ms, 1.0 ms, 0.5 ms, and 0.2 ms ▪ Composite 2V Sweep magnifications: 10.0 ms, 2.0 ms, 1.0 ms, and 0.4 ms
9	SWEEP	Press to cycle the waveform between 1H (one horizontal line of video), 2H (two successive lines of composite video only), 1V (one vertical field of video), or 2V (two successive fields of composite video only).
10	GAIN	Press to cycle through the vertical gain of 1, 2.5, or 5 for the waveform and vector display.
11	LINE SELECT	Press to cycle the line select display to ODD, EVEN, or OFF.
12	ZOOM	Press to cycle through the various zoom displays for the selected waveform or vector pane or Audio (if installed). Zoom mode is indicated with “ZOOM” at the top of the selected pane.
13	PHASE	(For Composite analog video only). When in Composite, the default LED is on. Line Select will turn the LED off. Press the PHASE button to turn it back on. Turn the CURVED ARROW knob to control the phase of the vector.
14	PRESET	Press to step through and select the four preset memories. If a preset does not exist, the Preset is skipped. Locked presets cannot be stored until they are unlocked.
15	UP	Press to step up through the Global Setup or pane menu.
16	SETUP/ENTER	Press to enter the Global Setup menu or a submenu when the Global Setup or Pane menu is displayed.
17	DOWN	Press to move down through the Global Setup or Pane menu.
18	EXIT	Press to exit the submenu, Pane menu, or Global Setup menu.
19	CURVED ARROW KNOB	▪ Rotate the knob to rotate the composite vector phase, or change the line number when line select is enabled. ▪ Rotate the knob to move the menu (Global or Pane menu) cursor up and down.
20	LEFT/RIGHT ARROW KNOB	▪ Rotate the knob to move the waveform left and right. ▪ Rotate the knob to move the menu (Global or Pane menu) cursor left and right.
21	UP/DOWN ARROW KNOB	▪ Rotate the knob to move the waveform up and down. ▪ Rotate the knob to move the menu (Global or Pane menu) cursor up and down.

Figure 3-2. Sample Multi-Display

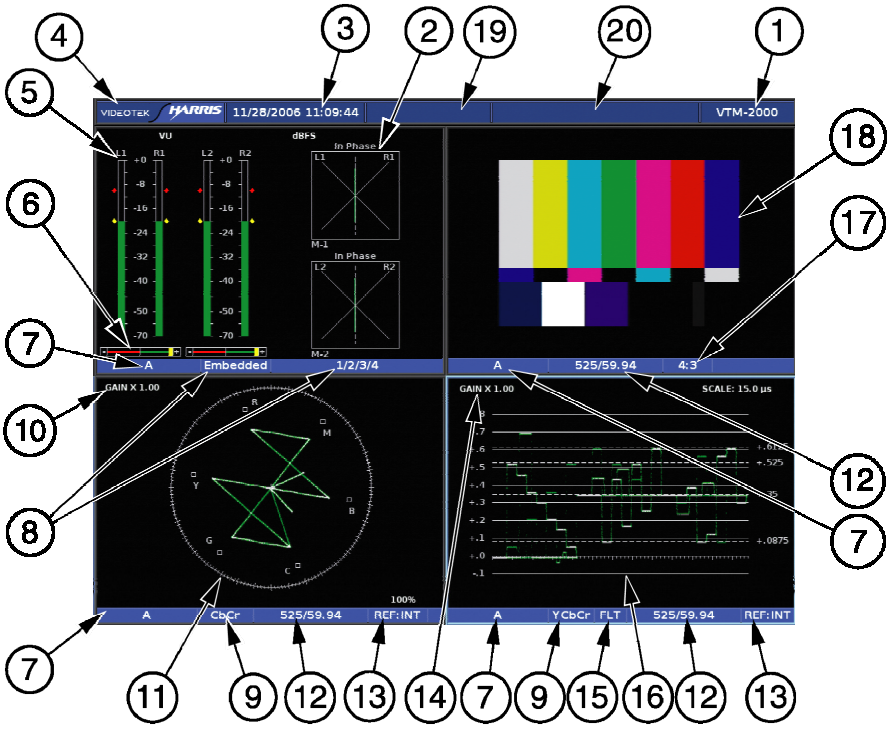


Table 3-2. Description of Quad Screen Display

Key	Description
1	Model identification
2	Lissajous (X, Y) display of the audio input meter.
3	Date and time of internal clock.
4	Company name.
5	Audio meters
6	Audio phase bar.
7	Indicates the input selection
8	Indicates the Audio format and input channels
9	Indicates the format selection.
10	Vector Gain indication
11	Vector display of the selected input.
12	Indicates the detected or selected video standard.
13	Indicates the reference source
14	Waveform gain indication
15	Indicates the Filter selection.
16	Waveform of selected input.
17	Indicates the aspect ratio of the picture.

(Table continues on next page)

Table 3-2. Description of Quad Screen Display (continued)

Key	Description
18	Displays the picture for the selected input.
19	Icon location
20	Latest alarm displayed (yellow indicates the current alarm, blue indicates the alarm was resolved)

Types of Controls

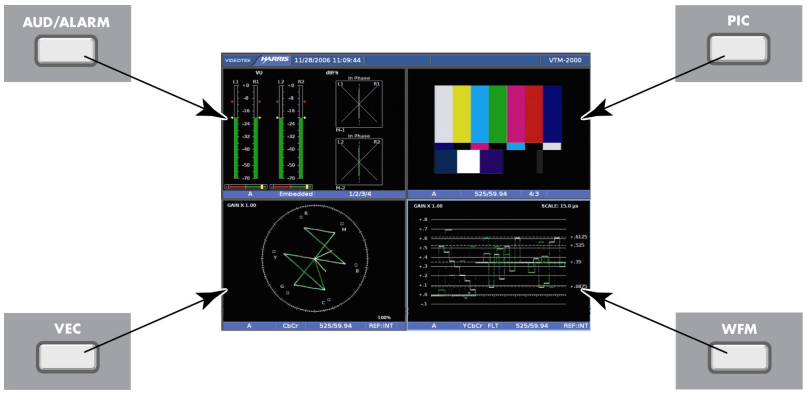
The VTM-2000 is controlled in three ways:

- **Display Modifiers**: controls on the front panel that adjust the parameters that are frequently used.
- **Pane Menu Settings**: Pop-up menus within a pane that are used to control the parameters for the individual pane.
- **Global Setup Menu Settings**: Setup menu parameters that affect the entire unit. The Setup menu is accessed by pressing the SETUP/ENTER button. See Section 4 for the Global Setup menu and the Global Setup menu selections.

Selecting a Pane

When multiple panes are displayed, only one pane can be selected at a time. The active pane is highlighted with a bright colored border. Press the desired function button to select the active pane to be configured, as shown in **Figure 3-3**.

Figure 3-3. Selecting a Pane



Full-Screen Display Selection

Press the FULL button in the function group to show a full-screen view of a selected pane. The full-screen display encompasses the entire screen. No other pane is displayed. Press the FULL button again to return to the Quad view.

Selecting a Video Input

Press the Input buttons to select input A, B, C, or D. When an input is selected, pressing another input button will change to the new input from the previous input.

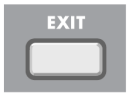
Powering Down from the Front Panel

Press and hold the EXIT and SETUP/ENTER buttons simultaneously until the four Preset LEDs are illuminated. The power is removed from the system except for the front panel. Push any button to repower the VTM-2000.

Navigating the Pane Setup Menu

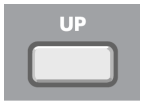
NOTE: A function button can be pressed to exit from the pane menu. If a different function than the displayed function is pressed, the highlighted pane will change to the selected function pane.

Use the NAVIGATION buttons or the SETUP POSITION knobs to navigate the Pane menu. The SETUP POSITION knobs and Navigation buttons are described below:



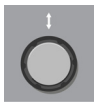
Press to exit the menu. Press to exit the submenu.

Press to select a menu item or open a menu or submenu.



Press to move up in the menu or submenu.

Press to move down in the menu or submenu.



Rotate the knob to move the menu cursor up and down or to change a value or condition in a menu.

Rotate the knob to enter or exit the submenus.

Rotate the knob to move the menu cursor up and down or to change a value or condition in a menu.

Reference

Press and hold an input button to display and change the Internal or External reference selection. The default reference selection is Internal. To change the reference selection:

1. Press and hold the INPUT button to access the Reference pane menu. **Table 3-3** shows the Reference menu selections.
2. When REFERENCE is highlighted, press the SETUP/ENTER button (or rotate the RIGHT/LEFT NAVIGATION knob) to open the menu selections.
3. Press the UP or DOWN button (or rotate the UP/DOWN NAVIGATION knob) to select the reference, and press the SETUP/ENTER button.
4. Press EXIT twice to exit the menu.

Table 3-3. Reference menu

REFERENCE	INTERNAL (Default)
	EXTERNAL

Pane Overview

There are two screens for the VTM-2000: full-screen display or Quad (4 display panes). Even if the screen is full screen or quad, the pane contains the Main Title Bar, the display, and the status bar. A diagram of the quad display is shown in **Figure 3-4**. A diagram of the full-screen display is shown in **Figure 3-5**.

Figure 3-4. Sample Quad Diagram

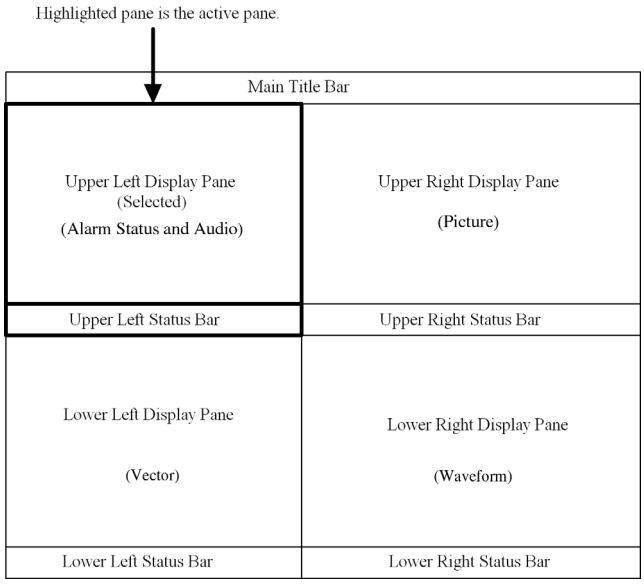
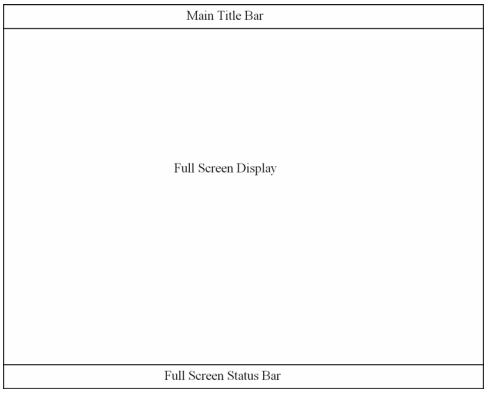


Figure 3-5. Full-Screen Display Diagram



Main Title Bar

The main title bar is displayed at the top of the screen, and contains the company name, date and time, icon indictors, most current alarm (alarm background color is yellow when active), and the model name.

Icons

Icons appear in the main title bar and are shown in a specified order (left to right). **Table 3-4** shows the icons and the condition for the appearance:

Table 3-4. Description of Icons

Icon	Condition
	Alarm condition active
	RCU connected and active.
	Panel Lock engaged

Status Bar

A status bar is located at the bottom of each pane. The status bar for each pane displays information based on the function selected and configuration applied. See the specific pane function section (Waveform, Vector, Audio, Picture, or Alarm) for more detailed information on the status bar that is displayed.

The Waveform Display

Pressing the WFM function button accesses the Waveform display in the lower-right pane. The waveform graticule scales, units of measure, and critical amplitude limits change according to the video format displayed. **Table 3-5** shows the Units of Measure that appear for a video format. **Table 3-6** lists the critical amplitude limits, which are indicated on the screen by dashed lines for the video formats that can be displayed.

Table 3-5. Video Formats and Units of Measure

Video Format	Unit of Measure
Standard Definition 525 and 625	Volts or Percent (Selectable)
Composite (NTSC)	IRE
Composite (PAL)	Units or Volts (Selectable)

Table 3-6. Video Formats and Critical Amplitude Limits

Video Format	Critical Amplitude Limits
Standard Definition	▪ 0.6125 V = upper 75% chroma limit ▪ 0.525 V = 75% luminance limit ▪ 0.350 V = 50% point; black for color difference channels ▪ 0.0875 V = lower 75% chroma limit
Composite (NTSC)	▪ 7.5 IRE – black level ▪ 78 IRE – flesh tone

A waveform display is shown in **Figure 3-6** and described in **Table 3-7**. The figure shows the location for the various waveform display fields.

Figure 3-6. Waveform Display Diagram

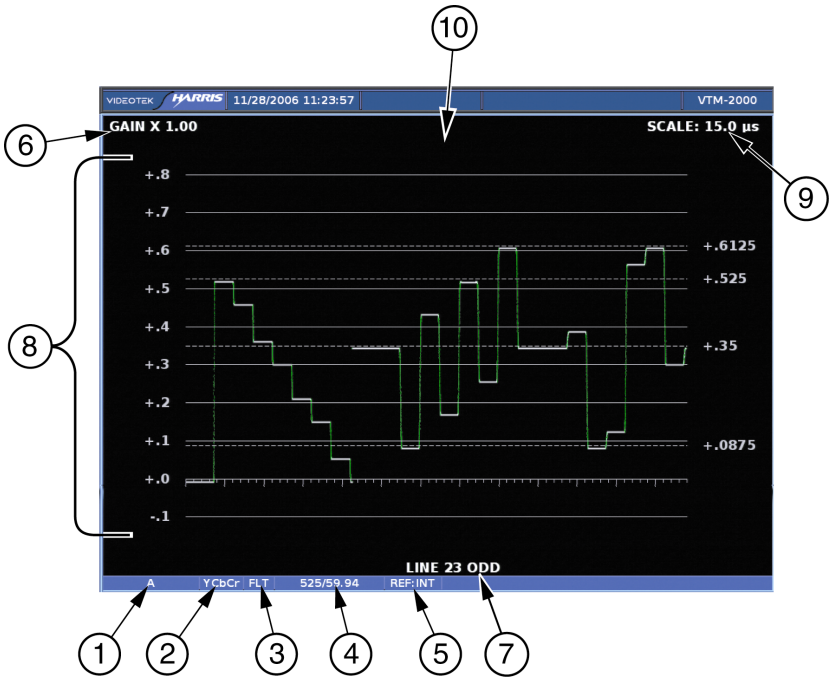


Table 3-7. Description of Waveform Display Diagram

Field Identifier	Field information	Nomenclature
1	Input	Displays the input.
2	Format	Displayed as YC_BC_R, RGB, YRGB, or Composite (CMPST). YC_BC_R, RGB, or YRGB can be selected in the SD FORMAT submenu of the WFM Pane menu.
3	Filter	▪ Displayed as FLT, LP, CHR, F/LP, or BOW (Bowtie) ▪ This can be selected in the COMPOSITE or COMPONENT FILTER submenu of the WFM Pane menu.
4	Standard	Displays the Line Rate/Frame Rate [525/59.94]. This is selected in the VIDEO FORMAT\VIDEO A though D menu.
5	Reference	Displays the reference as INT (Internal) or EXT (External).
6	Gain	Displays the selected gain. The Gain ranges are 1.00, 2.50, and 5.00. Change by pressing the GAIN button.
7	Line select information	Line select is shown as Line number with the ODD or EVEN field.
8	WFM graticule	Shows the WFM RGB, YC_BC_R, or Composite graticule. The graticule is dependent upon the Video format, Zoom, and scale selections.
9	Scale	Indicates the major graticule indications for time.
10	Zoom	▪ Displays Zoom when enabled ▪ Blank when Zoom is disabled ▪ Press the ZOOM button to cycle through the ZOOM modes.

Graticules are configured by selecting the Video Input Format along with the appropriate Waveform Setup scale adjustment (Units, %, or Volts). The scales can also change when ZOOM is pressed.

Figure 3-7 to Figure 3-9 illustrates some waveform graticules with the critical amplitude limits for the video formats that can be displayed by the VTM-2000. The critical amplitude limits are indicated on the screen by dashed lines.

Figure 3-7. RGB and YC_BC_R Graticule

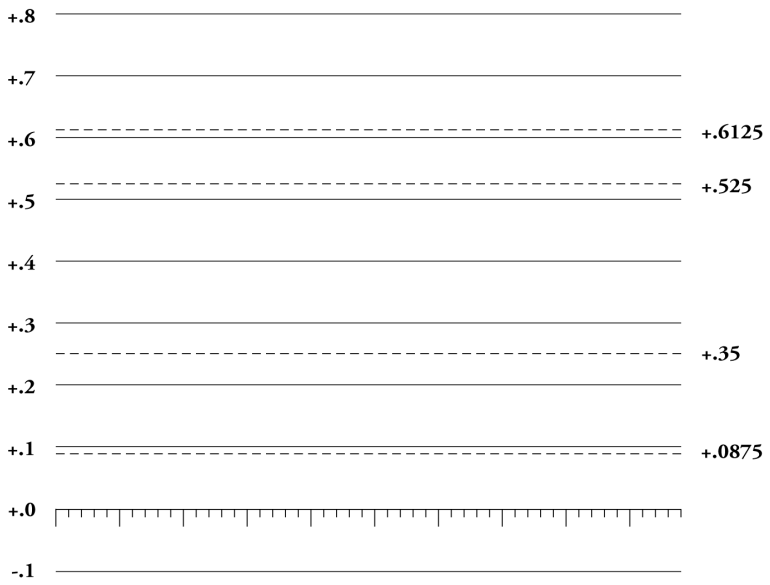


Figure 3-8. RGB and YC_BC_R Zoom 0 mV Graticule

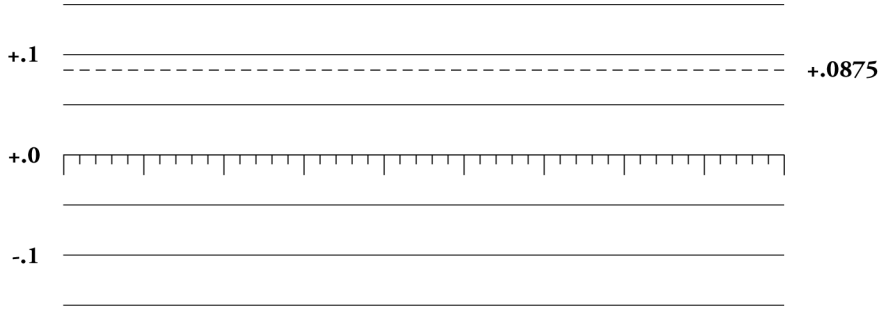
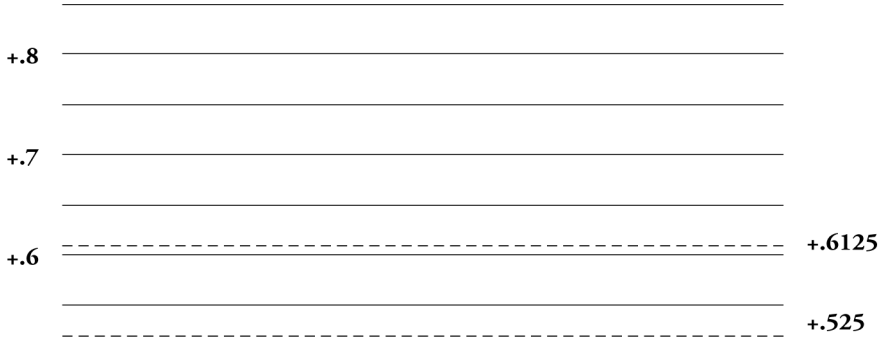


Figure 3-9. RGB and YC_BC_R Zoom 700 mV Graticule



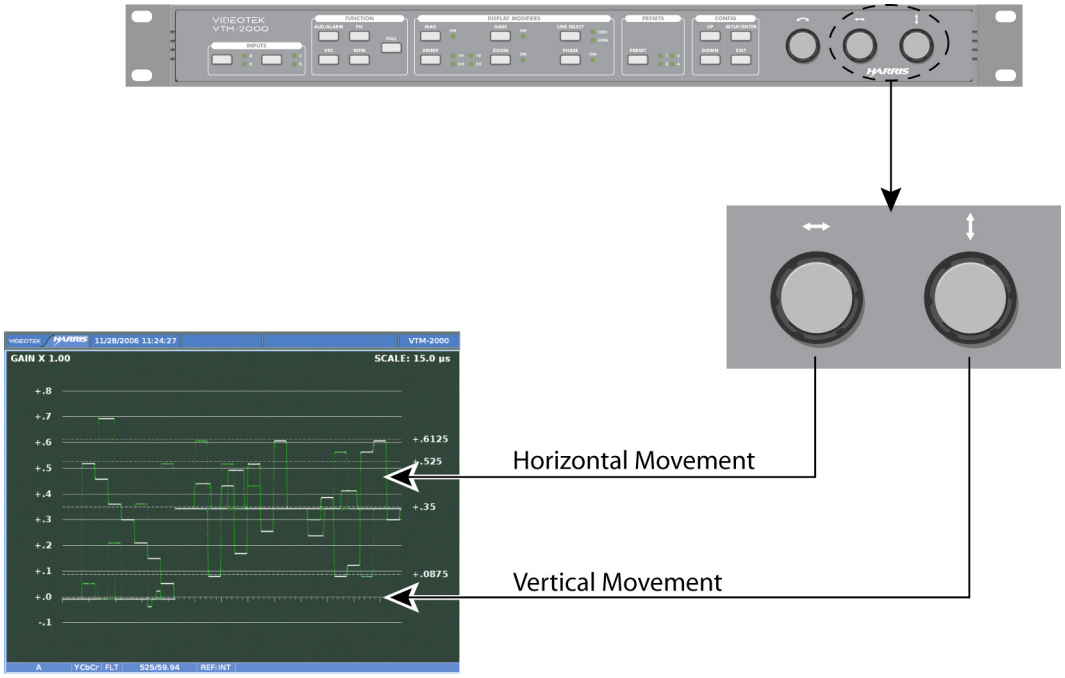
Waveform Front Panel Selections

The following controls directly affect the waveform display.

Moving the Waveform using the Setup Knobs

Move the Waveform display relative to the graticule by using the LEFT/RIGHT NAVIGATION knob (for horizontal movement) and the UP/DOWN NAVIGATION knob (for vertical movement), as shown in **Figure 3-10**. Centering the waveform is performed by using the Waveform pane menu (by pressing and holding the WFM button).

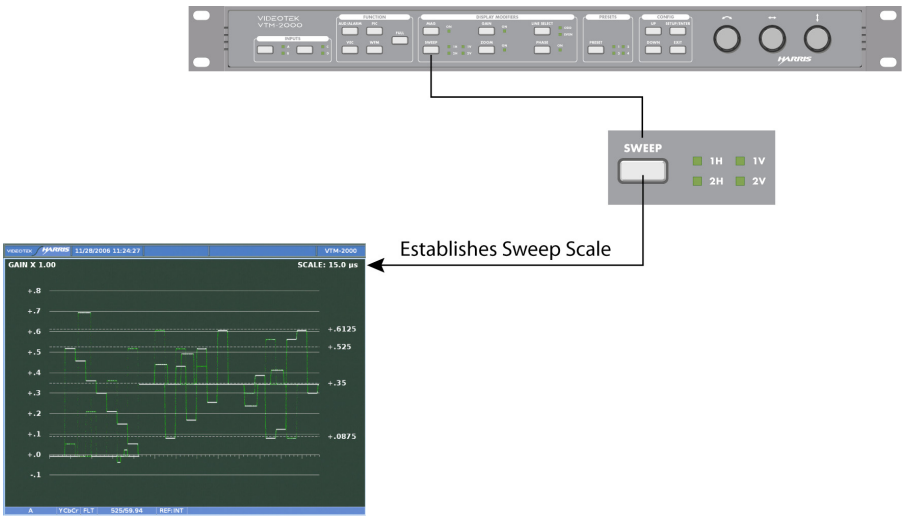
Figure 3-10. Moving the Waveform



Sweep Button

The Sweep button is used to determine the sweep rate scale. The scale is displayed in the upper-right area of the waveform pane, as shown in **Figure 3-11**.

Figure 3-11. Establishing the Sweep Scale



NOTE: A menu selection is available to produce a 4H or 4V waveform.

For horizontal sweeps, press the SWEEP button to select 1H or 2H. For vertical sweeps, press the SWEEP button to select 1V or 2V. 2H and 2V are composite only. 1H or 1V SWEEP is possible when a single paraded component has been selected for display.

Mag Button

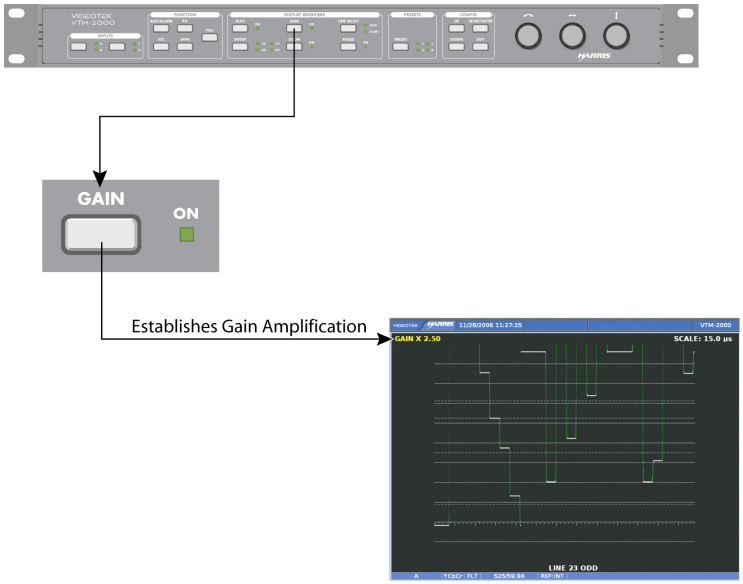
Press the MAG button to change the horizontal magnification or to turn the magnification OFF. The magnifications are shown below:

- Component 1H Sweep magnifications: 15.0 µS, 3.0 µS, and 1.5 µS
- Component 1V Sweep magnifications:15.0 ms, 3.0 ms, 1.5 ms, and 0.6 ms
- Composite 1H Sweep magnifications: 5.0 µS, 1.0 µS, 0.5 µS
- Composite 2H Sweep magnifications: 10.0 µS, 2.0 µS, 1.0 µS
- Composite 1V Sweep magnifications: 5.0 ms, 1.0 ms, 0.5 ms, and 0.2 ms
- Composite 2V Sweep magnifications: 10.0 ms, 2.0 ms, 1.0 ms, and 0.4 ms

Gain Button

Gain is used to set the range of the vertical amplification in the video signal. The standard gain in the video signal is x1. The gain setting appears in the upper-left portion of the waveform pane, as shown in **Figure 3-12**. The Gain steps are x1, x2.5, and x5.

Figure 3-12. Establishing the Gain



Zoom Button

Press the ZOOM button to cycle through one of three display selections:

- ZOOM positioned on the 0 IRE, 0 mV, or 0% graticule line
- ZOOM positioned on the 100 IRE or 700 mV, or 100% graticule line
- Normal

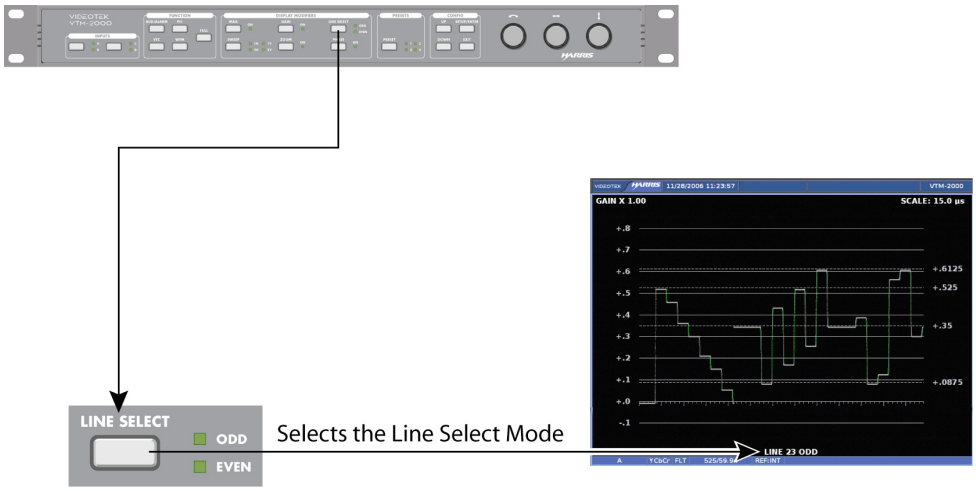
At each zoom position, the graticule scale and waveform displays expand to provide more resolution around the zoom point.

Placing the Waveform Display in Line Select Mode

Pressing the LINE SELECT button enables the waveform pane to monitor a single line of a video signal. This enables Line Select to monitor individual areas of the entire image.

1. Press the LINE SELECT button to place the waveform display pane in Line Select mode. At the bottom-center of the display, the pane displays the Line number and Odd or Even field, as shown in **Figure 3-13**. When Vertical Sweep mode (1V or 2V) is enabled, the selected line is displayed in red. To view a line in Line Select mode:

Figure 3-13. Establishing Line Select



2. Press the LINE SELECT button again to alternate between the ODD, EVEN, and all fields.
3. Rotate the CURVED ARROW knob to select the line to be displayed.

Waveform Pane Menu Selections

Pressing and holding the WFM button enables the Waveform pane menu. The Waveform Pane menu is described in **Table 3-8** for analog waveform monitoring, and **Table 3-9** for SD-SDI waveform monitoring. **The submenus are different for each format.**

NOTE: The component sequence selections are dynamically dependent on the SD and Composite format selection. The component selections will only be shown when the component formats are selected.

Table 3-8. Waveform (Analog) Menu Structure

COMPOSITE FILTER	FLT (FLAT) (Default)
	LP (LOW PASS)
	CHR (CHROMA)
	F/LP (FLAT & LOW PASS)
CENTER WAVEFORM	Press SETUP/ENTER
WAVEFORM SETUP	Press SETUP/ENTER

Table 3-9. Waveform (Digital) Menu Structure

COMPONENT FILTER	FLT (FLAT) (Default)
	LP (LOW PASS)
	BOW (BOWTIE)
PARADE/OVERLAY	PARADE (Default)
	OVERLAY
SD FORMAT	YC_BC_R (Default)
	RGB
	YRGB
BLANKING	BLANK ALL (Default)
	SHOW SAV/EAV
	SHOW ALL
COMPONENT SEQUENCE	If YC_BC_R is selected (Y, C_B, C_R)
	If RGB is selected (R, G, B)
	If YRGB is selected (Y, R, G B)
CENTER WAVEFORM	Press SETUP/ENTER
WAVEFORM SETUP	Press SETUP/ENTER

Filter Selection

The filters available are dependent upon the input format. The filters available are:

- **Flat**: No filtering.
- **Low Pass**: Selects the Low Pass filter.
- **Chroma**: Selects the Chroma filter. (Composite only)
- **Bowtie**: The bowtie filter is used to check the timing relationships between the digital components. A bowtie test signal is required. (Component only)
- **Flat and Low Pass:** Flat and Low Pass combination. (Composite only)

Parade and Overlay Selections

Multiple components can be displayed in a single pane.

- When PARADE is selected, the components are shown next to one another (i.e. Inputs Y, then C_B, then C_R in a YC_BC_R signal).
- When OVERLAY is selected the components of the input signal are displayed over each other (i.e. R over G over B in an RGB signal).

Format

When in the Format menu, select one of the display formats: RGB, YRGB, or YC_BC_R. The selected RGB, YRGB, or YC_BC_R text is indicated with a check mark.

Blanking (SD-SDI only)

The blanking selections are Blank All, SAV/EAV, and Show All.

- "Blank All" displays only the active video of the input signal.
- "Show SAV/EAV" displays the active video and the SAV/EAV headers of the input signal.
- "Show All" displays the ancillary data, SAV/EAV, and active video.

Component Sequence (SD-SDI only)

Select to enable the component Y, C_B, and C_R when YC_BC_R is used, Y, R, G, and B, when YRGB is used, or R, G, and B when RGB is used.

Center Waveform

Press the SETUP/ENTER button to activate the Center Waveform selection. Once SETUP/ENTER is pressed, the waveform returns to the center of the waveform graticule.

Waveform Setup

Press the SETUP/ENTER button to access the global Waveform setup menu. For more information on the global Waveform Setup menu see Section 4.

Utilizing the Vector Display

Pressing the VEC button highlights the Vector display in the lower-left pane. A vector display is shown in **Figure 3-14** and described in **Table 3-10**. This illustrates the general location for the various vector fields.

Figure 3-14. Vector Display Diagram

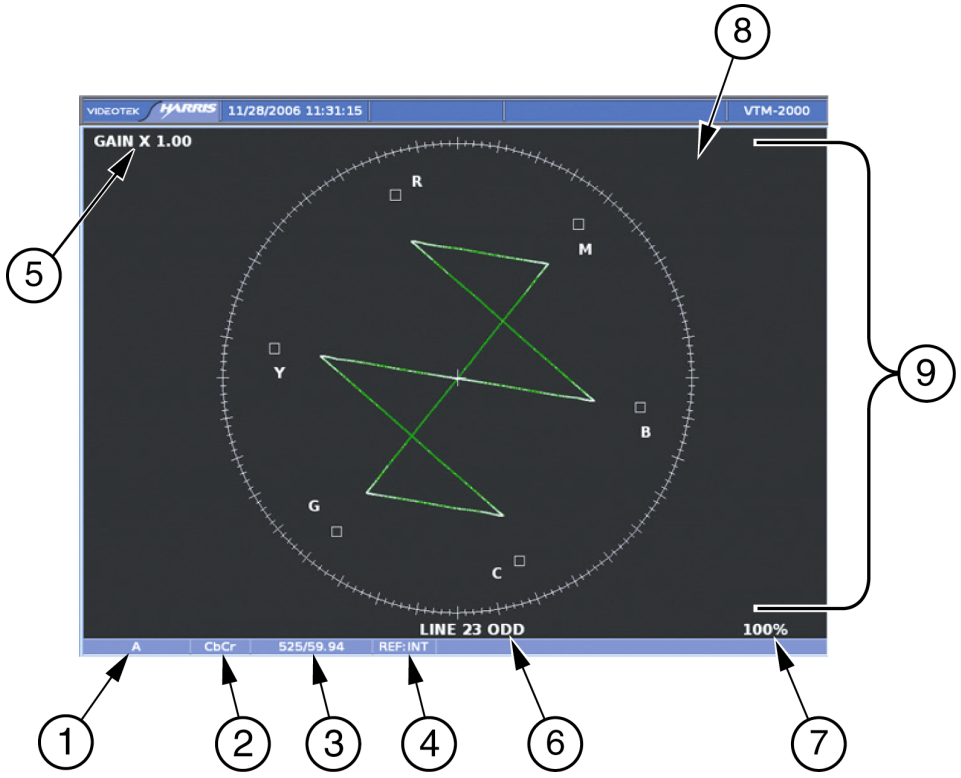


Table 3-10. Description of Vector Display Diagram

Field Identifier	Field information	Nomenclature
1	Input	Displays the input.
2	Format	Displayed as Composite and C_BC_R.
3	Standard	Displays the Line Rate/Frame Rate [525/59.94]. This is selected in the VIDEO FORMAT\VIDEO A THRU D CONFIGURE menu.
4	Reference	Displays the reference as INT (Internal), EXT (External).

(Table continues on next page)

Table 3-10. Description of Vector Display Diagram (continued)

Field Identifier	Field information	Nomenclature
5	Gain	Displays the gain where Gain is 1.00, 2.50, 5.00. This is changed by pressing the GAIN button.
6	Line select information	Line select is shown as Line and the number with the ODD or EVEN field.
7	Vector Standard	Displayed as 75% or 100%. This is selected in the Vector Pane setup submenu called SD STANDARD.
8	Zoom	▪ Zoom (when enabled) ▪ Blank when disabled ▪ Press the ZOOM button to cycle through the Zoom modes.
9	Vector graticule	Shows the Vector graticule.

Graticules are configured by selecting the Video Input Format along with the appropriate Vector Setup standard.

Some graticule scales are illustrated in **Figure 3-15** to **Figure 3-21**.

Figure 3-15. Vector NTSC Graticule

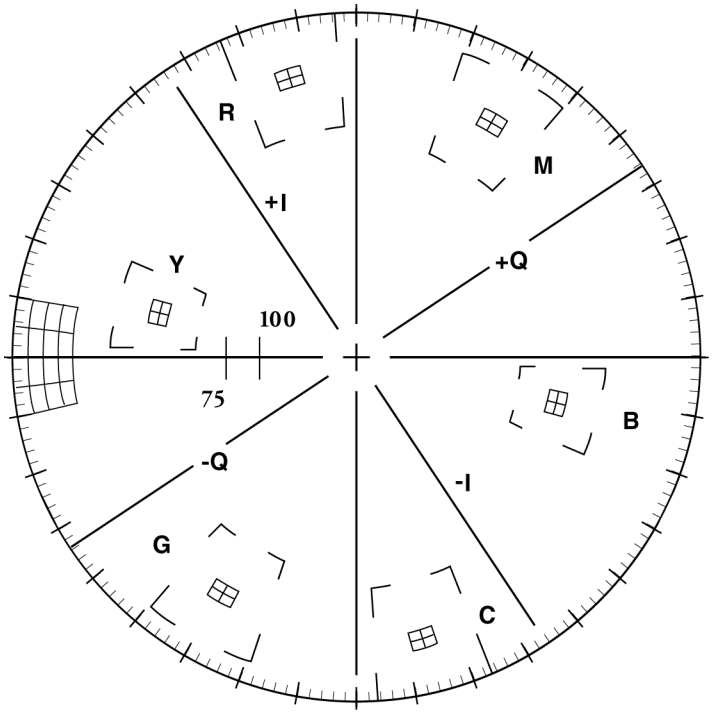


Figure 3-16. Vector NTSC Zoom Upper Left

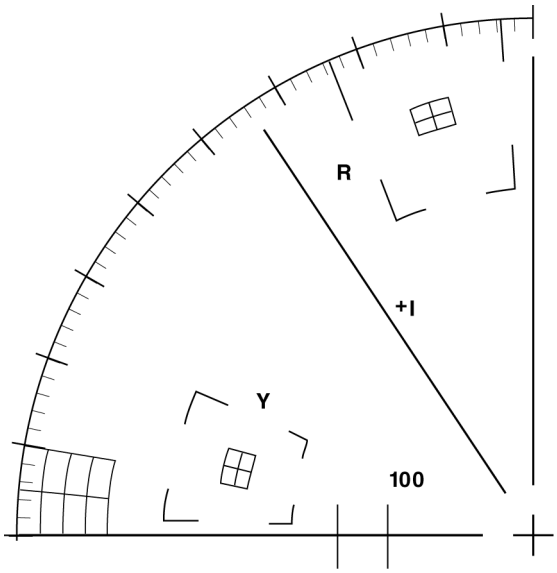


Figure 3-17. Vector NTSC Zoom Upper Right

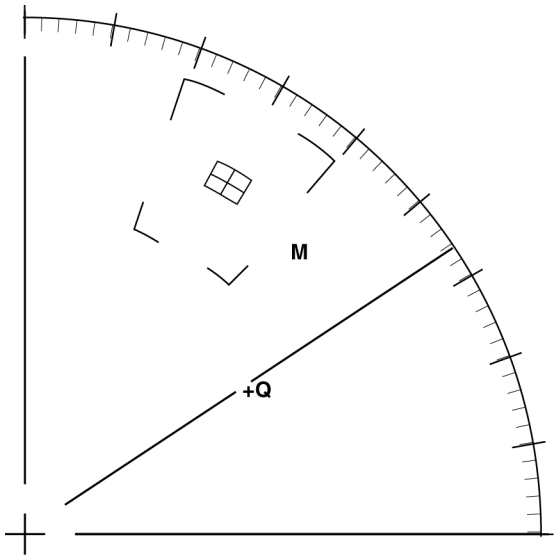


Figure 3-18. Vector NTSC Zoom Lower Right

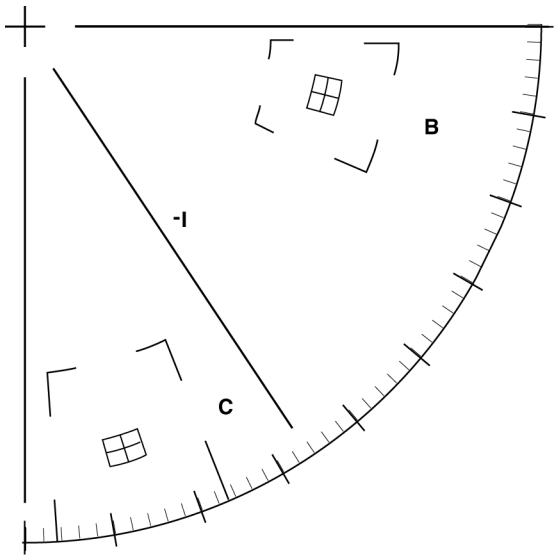


Figure 3-19. Vector NTSC Zoom Lower Left

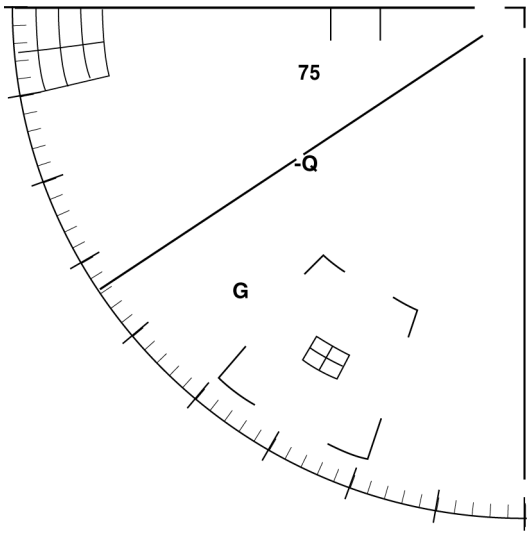


Figure 3-20. Vector PAL Zoom Center

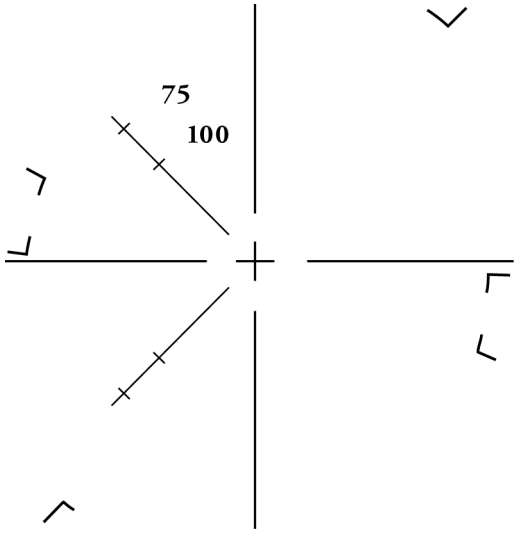
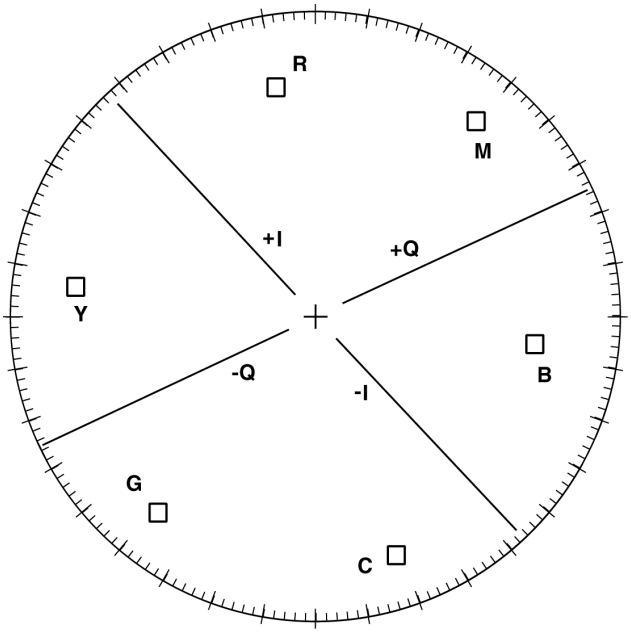


Figure 3-21. Vector SD with I/Q



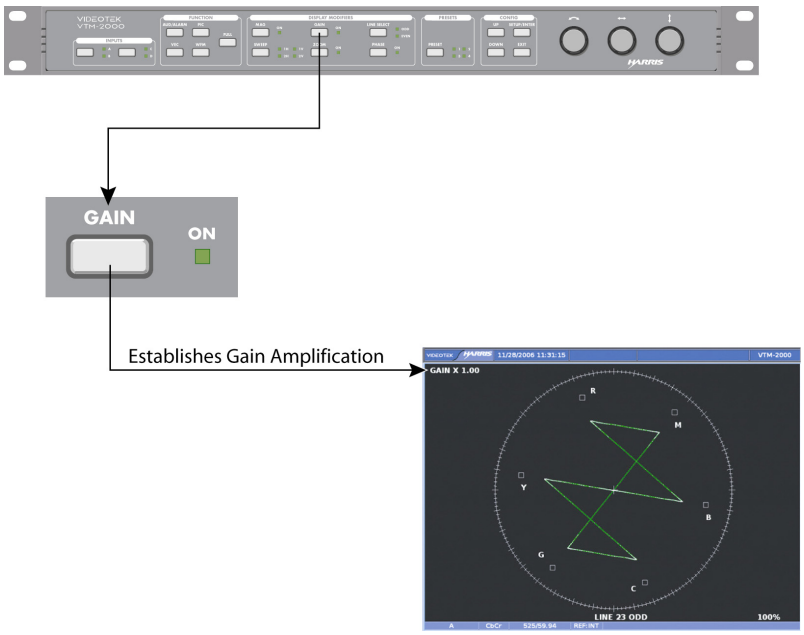
Controlling the Vector

(For Composite analog video input only) When in Composite, the default LED is on. Line Select will turn the LED off. Press the PHASE button to turn it on. Turn the CURVED ARROW knob to control the phase of the vector.

Gain Button

The standard gain in the vector is x1.0. The VTM-2000 can be used to set the gain amplification in the video signal using the Gain button. The gain setting appears in the upper-left portion of the vector pane, as shown in **Figure 3-22**.

Figure 3-22. Establishing the Vector Gain



Press the GAIN button to step through the available gain selections x1.0, x2.5, and x5.0.

Zoom Button

Press ZOOM to cycle through one of six displays:

- Expand the center
- Expand the upper-left quadrant
- Expand the upper-right quadrant
- Expand the lower-right quadrant
- Expand the lower-left quadrant
- Normal

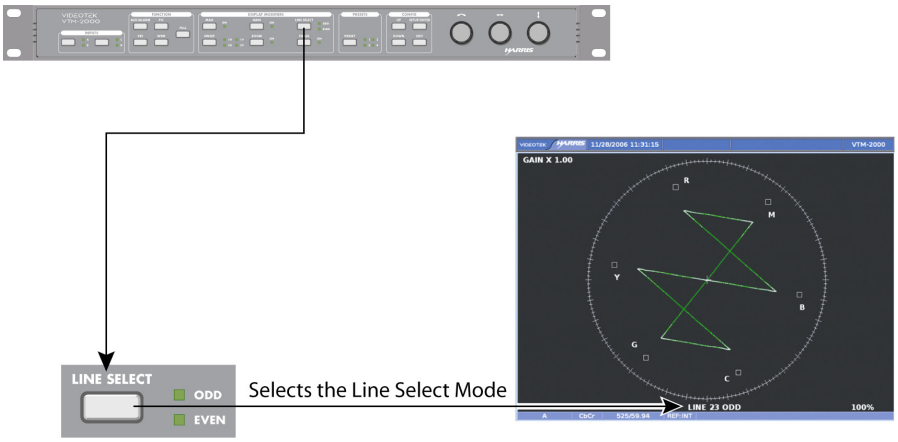
Placing the Vector Display in Line Select Mode

NOTE: Vector Line Select only functions when in 1H or 2H sweep, or full screen.

Pressing the LINE SELECT button enables the vector pane to monitor a single line of a video signal. This enables Line Select to monitor individual areas of the entire image. To view a line in Line Select mode:

1. Press the LINE SELECT button to place the selected vector display pane in Line Select mode. At the bottom-center of the display, the pane displays the Line number and Odd or Even field, as shown in **Figure 3-23**.

Figure 3-23. Establishing Line Select



2. Press the LINE SELECT button again to alternate between the ODD, EVEN, and all fields.
3. Rotate the CURVED ARROW knob to select the line to be displayed.

Vector Pane Menu Selections

Pressing and holding the VEC function button selects the Vector pane menu. Use the SETUP POSITION knobs or the UP, DOWN, ENTER, and EXIT buttons to navigate the Pane menu.

The Vector Pane menu is described in **Table 3-11**.

Table 3-11. Vector Pane Menu

ANALOG/SD STANDARD	75%
	100%
POSITION	USE H POS AND V POS KNOB.
CENTER VECTOR	Press SETUP/ENTER
SETUP	Press SETUP/ENTER

Standard

Standard is used to set the marks on the vector display. The marks on the vector help to visualize the minimum/maximum value of a video signal. The position of the excursion marks are 75% or 100% for analog and SD.

Vector Position

The Vector Position can be adjusted by using the UP/DOWN and RIGHT/LEFT knobs.

Center Vector

Centering of the vector can be accomplished by pressing the SETUP/ENTER button.

Vector Setup

Press the SETUP/ENTER access the global Vector setup menu. For more information on the global Vector Setup menu see Section 4.

Picture Display

The picture display pane is used to show the picture of the selected input. Press the PIC button to highlight the picture pane. A Picture display diagram is shown in **Figure 3-24** and described in **Table 3-12**.

Figure 3-24. Picture Display Diagram

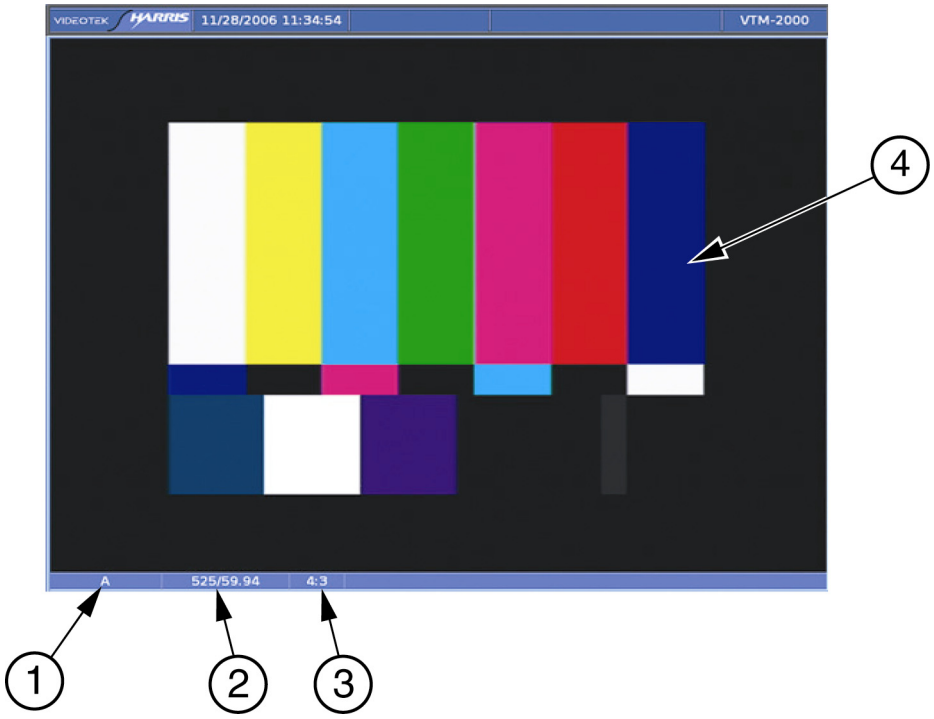


Table 3-12. Description of Picture Display Diagram

Field Identifier	Field information	Nomenclature
1	Input	Displays the input.
2	Standard	Displays the Line Rate/Frame Rate [525/59.94]. Select the Standard in the VIDEO FORMAT\VIDEO A thru D CONFIGURE menu.
3	Aspect Ratio	Displays the aspect ratio.
4	Picture	Displays the picture of the selected video input.

Alarm Status Display

Pushing the AUD/ALARM button toggles between the audio and alarm display. Press the AUD/ALARM button to display the alarm display. The default display is the Audio display when the audio option is installed. For information on individual alarms, see Setting Alarms and Alarm Descriptions in Section 5.

The Alarm Status Display lists all the alarms, the state of each alarm setting, the current alarm limit selection (if applicable), the current alarm duration (if applicable), and the Total alarm column. An alarm status display diagram is shown in **Figure 3-25** and described in **Table 3-13**. The diagram illustrates the general location for the various alarm status display fields.

Figure 3-25. Alarm Status Display Diagram

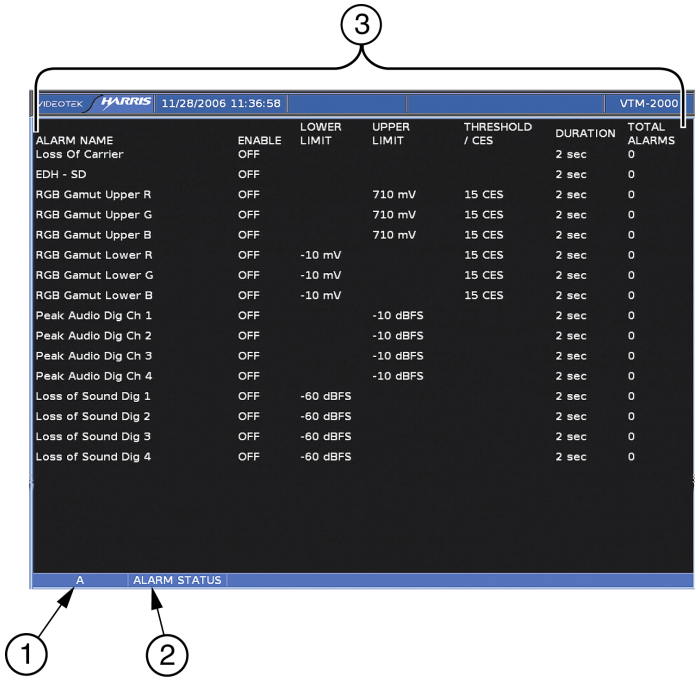

3
VIDEOTEK HARRIS 11/28/2006 11:36:58 VTM-2000
ALARM NAME ENABLE LOWER LIMIT UPPER LIMIT THRESHOLD / CES DURATION TOTAL ALARMS
Loss Of Carrier OFF 2 sec 0
EDH - SD OFF 2 sec 0
RGB Gamut Upper R OFF 710 mV 15 CES 2 sec 0
RGB Gamut Upper G OFF 710 mV 15 CES 2 sec 0
RGB Gamut Upper B OFF 710 mV 15 CES 2 sec 0
RGB Gamut Lower R OFF -10 mV 15 CES 2 sec 0
RGB Gamut Lower G OFF -10 mV 15 CES 2 sec 0
RGB Gamut Lower B OFF -10 mV 15 CES 2 sec 0
Peak Audio Dig Ch 1 OFF -10 dBFS 2 sec 0
Peak Audio Dig Ch 2 OFF -10 dBFS 2 sec 0
Peak Audio Dig Ch 3 OFF -10 dBFS 2 sec 0
Peak Audio Dig Ch 4 OFF -10 dBFS 2 sec 0
Loss of Sound Dig 1 OFF -60 dBFS 2 sec 0
Loss of Sound Dig 2 OFF -60 dBFS 2 sec 0
Loss of Sound Dig 3 OFF -60 dBFS 2 sec 0
Loss of Sound Dig 4 OFF -60 dBFS 2 sec 0
A ALARM STATUS
1
2

Table 3-13. Description of Alarm Status Display Diagram

Field Identifier	Field information	Nomenclature
1	Input	Displays the input.
2	Display Label	Displayed as ALARM STATUS
3	Column Labels	Displays the columns ALARM NAME, ENABLE, LOWER LIMIT, UPPER LIMIT, THRESHOLD/CES, DURATION, and TOTAL ALARMS.

The alarm status screen contains alarm name text that can appear in a colored state. The colored states are:

- **White**: indicates alarm is not enabled.
- **Green**: indicates alarm is enabled and not exceeding alarm limits.
- **Red**: indicates the alarm is enabled and exceeding an alarm limit.

There is a slight persistence for any Alarm Name color change.

The total alarm count can be cleared through the Alarm Status pane menu. Press and hold the AUD/ALARM button to display the Alarm Status pane menu. The Alarm Status pane menu is described in **Table 3-14**.

Table 3-14. Alarm Status Pane Menu

CLEAR ALARM COUNT	PRESS SETUP/ENTER

Audio Display

Press the AUD/ALARM button to display the audio display. The VTM-2000 accepts up to 4 AES/EBU, 4 mono analog or 2 stereo analog pair, and four groups of embedded inputs, and displays up to 4 analog channels.

The audio types are selected by pressing the SETUP button and selecting AUDIO SETUP\CONFIGURE INPUT A thru D\AUDIO TYPE menu:

- **ANALOG**
- **AES/EBU** - A digital audio standard established jointly by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).
- **EMBEDDED** - Digital audio information multiplexed onto a serial digital data stream. Up to sixteen channels can be multiplexed on a single stream of 601 video, minimizing cabling and routing requirement.

Lissajous can be selected as Soundstage or X-Y displays.

Input assignments, scaling, input levels, and response can also be modified using the Audio Setup menu.

Audio Scales

The Vertical audio graticule scales change according to the scale selections made in the AUDIO SETUP\METER SETUP\ANALOG or DIGITAL SCALE menu and the format being displayed.

The Scales are:

- TYPE I
- Type IIa
- Type IIb
- Type I + 8
- Nordic

- DIN 45406
- dBFS (Digital only)
- Zero Ref dBFS (ref –20 dBFS) (Digital only)

Vertical Audio Displays

The Vertical Meter displays the level and reference in a vertical format. There are four analog audio input channels (two stereo pairs), four AES/EBU digital input channels (eight stereo pairs), and 16 embedded audio channels (serial-digital video input only) available for selection in the menu. A maximum of four channels can be displayed simultaneously. Audio inputs can be assigned to any meter pair on the display.

The displayed inputs can also be monitored as analog signals on the 37-pin, D-Sub, ANALOG INPUT/OUTPUT connector. The displayed AES/EBU or embedded audio will be converted to analog audio for the monitoring output. The output audio level can be adjusted from -50 dB to +6 dB around the reference-input level. The default output level for a -20 dBFS input produces a +4 dBm analog output level (600Ω). For example, when applying a gain adjustment of +6 dB to the output with a -20 dBFS input signal, the audio output level will be +10 dBm into a 600Ω termination. This Audio Output Level adjustment is made in the AUDIO SETUP\OUTPUT PREFERENCES menu. The Audio Output Level adjustment default is 0 dB.

The phase bars are used to monitor the instantaneous phase relationship between two channels of audio. The "+" marking indicates a phase difference of 0°, and the "-" marking indicates a phase difference of 180°. A properly phased stereo pair produces a phase pointer that moves within the green zone, whereas a reversed channel produces a pointer that moves within the red zone. The phase bar polarity in the AUDIO SETUP\METER SETUP\CONFIGURE PHASE BARS\POLARITY menu can be set to Normal or Reverse.

The effect of higher damping in a phase meter is to show an averaged rather than a peak value of phase. The Phase Bar Damping in the AUDIO SETUP\METER SETUP\CONFIGURE PHASE BARS\DAMPING can be set from FAST, 1 to 10, and SLOW.

The lissajous display appears for 2 and 4 bar graphs on the right of the audio pane. The lissajous display shows the amplitude and phase relationship between two input signals.

Vertical Audio display diagrams are shown in **Figure 3-26** to **Figure 3-27** and described in **Table 3-15** to **Table 3-16**. The Vertical audio graticule scales change according to the scale selections made in the Setup menu and the format being displayed. Some of the markings in the illustrations do not normally appear on the display.

Figure 3-26. Two Bar Graph Display with Lissajous Diagram

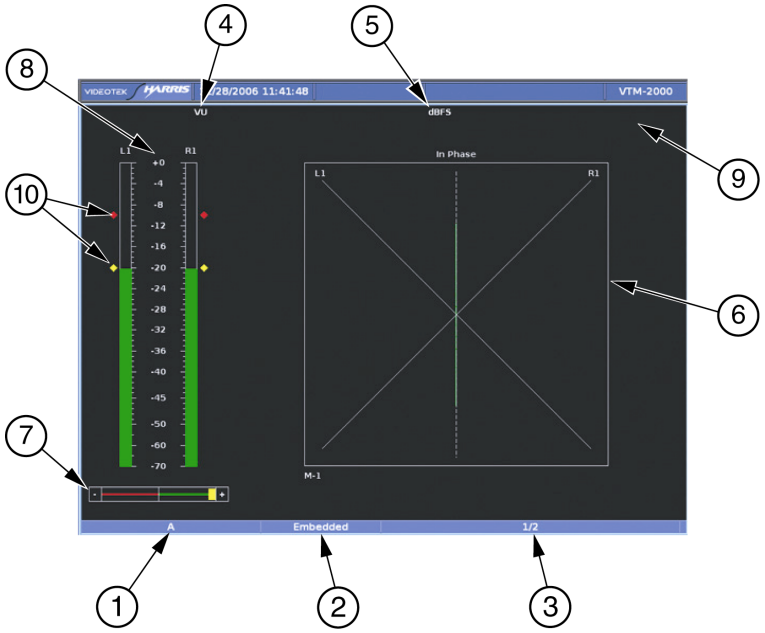


Table 3-15. Description of Two Bar Graph Display with Lissajous Diagram

Field Identifier	Field information	Nomenclature
1	Input	Displays the video input associated with the audio.
2	Audio Type	Displayed as Analog, AES/EBU, or Embedded
3	Audio Input	Monitored Audio channels that are associated with the meters. Shown as 1 to 16 (analog is 1 to 4, AES is 1 to 8, and Embedded is 1 to 16).
4	Meter Response	Displays the selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak.
5	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, or Zero REF dBFS (scales are dependent upon audio type).
6	Lissajous Display	Lissajous of bar graph 1 with labels for R, L, and the number of the meter being monitored (i.e. M-1)
7	Phase Bar	Phase Meter of bar graph 1
8	Audio Graticule (with meter labels)	Shown as Stereo Pairs (L1, R1)
9	Zoom	▪ Zoom (when enabled) ▪ Blank when disabled
10	Peak Program and Reference Level Markers	Shows the peak and reference levels for the signal. This can be adjusted in the AUDIO SETUP\METER SETUP\REF LEVEL DIGITAL (or ANALOG) menu and Peak Program Level and Analog menus.

Figure 3-27. Four Bar Graph with Lissajous Display Diagram

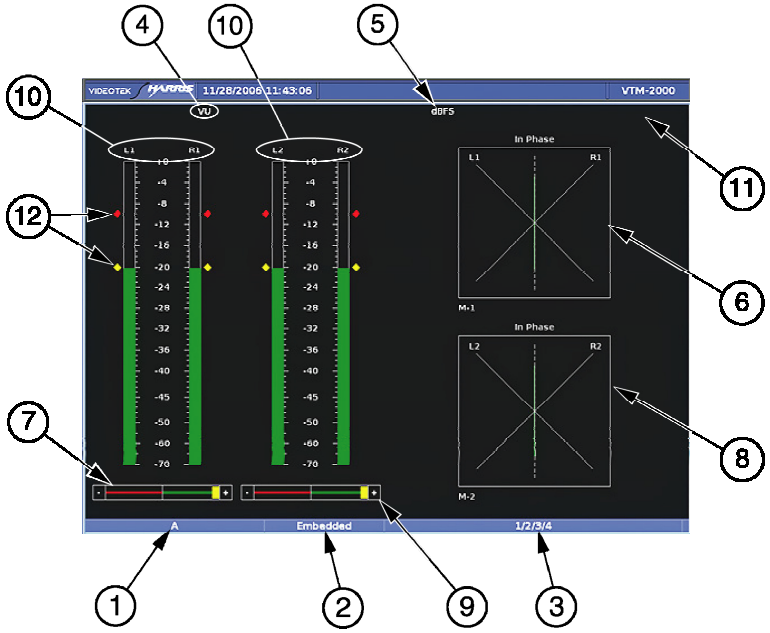


Table 3-16. Description of Four Bar Graph with Lissajous Display Diagram

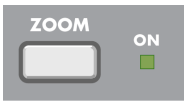
Field Identifier	Field information	Nomenclature
1	Input	Displays the video input associated with the audio.
2	Audio Type	Displayed as Analog, AES/EBU, or Embedded
3	Audio Input	Monitored Audio channels that are associated with the meters. Shown as 1 to 16 (analog is 1 to 4, AES is 1 to 8, and Embedded is 1 to 16).
4	Meter Response	Displays the selected meter response: VU, Peak, True Peak, VU + Peak, VU + True Peak
5	Scale Selection	Displays the selected meter scale: Type I, Type IIa, Type IIb, Type I + 8, Nordic, DIN 45406, dBFS, Zero REF dBFS (scales dependent upon audio type).
6	Lissajous Display (1)	Lissajous of bar graph 1 with labels for R, L, and the number of the meter being monitored (i.e. M-1)
7	Phase Bar (1)	Phase Meter of bar graph 1
8	Lissajous Display (2)	Lissajous of bar graph 1 with labels for R, L, and the number of the meter being monitored (i.e. M-2)
9	Phase Bar (2)	Phase Meter of bar graph 2
10	Audio Graticule (with meter labels)	Shown as L1, R1, L2, and R2.

(Table continues on next page)

Table 3-16. Description of Four Bar Graph with Lissajous Display Diagram

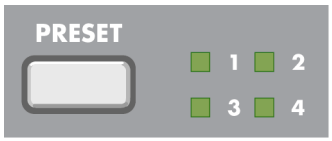
Field Identifier	Field information	Nomenclature
11	Zoom	▪ Zoom (when enabled) ▪ Blank when disabled
12	Peak Program and Reference Level Markers	Shows the peak and reference levels for the signal. This can be adjusted in the AUDIO SETUP\METER SETUP\REF LEVEL DIGITAL (or ANALOG) menu and Peak Program Level and Analog menus.

Expanding the Audio Display



Press the ZOOM button to access the audio zoom feature. The Audio Meter scale is expanded +/- 5 dB around the reference level of every scale.

Presets



Presets are used to store menu configurations and display settings. A total of three presets can be stored in the VTM-2000. Press the PRESET button to select user-configurable presets 1 through 3. If a preset does not exist, the Preset is skipped. Preset 4 is locked with the factory default values. Preset 4 cannot be changed. For more information on Preset 4, see Preset 4 (Factory Preset).

Storing Presets

To store a new preset:

1. Make all changes to the front panel controls and/or the Setup menu.
2. Press and hold the PRESET button until the preset LEDs blink. The blinking LED next to Preset 1 indicates that it is ready to store the new settings.
3. Press the PRESET button to advance to the desired preset number. The blinking LED indicates that it is ready to store the new settings in the selected preset.
4. Once the preset is selected, press the SETUP/ENTER button to store the settings in the new preset. The LED is illuminated and steady. Any previous setup conditions at the selected preset are erased and the new settings are stored.

Recalling Presets

NOTE: Information must be stored in a preset location before being recalled.

Press PRESET to directly select the stored preset in any number from 1 to 4. Presets 1 to 3 are user-configurable presets. Select Preset 4 to select the factory default settings.

If a preset does not exist, the Preset is skipped. There is a slight delay when stepping between presets.

Preset 4 (Factory Preset)

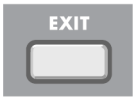
Select Preset 4 to access the factory-preset mode. This preset contains the factory default settings.

Section 4 ♦ Global Setup Menu Functions

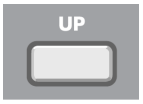
Navigating the Setup Menu

Press the SETUP button to access the global setup menu. Use the SETUP POSITION knobs or the SETUP/ENTER, UP, DOWN, and EXIT buttons to navigate the Global Setup menu. The SETUP POSITION knobs and Navigation buttons are described below:

- Press to enter the Setup menu.
- Press to move to the submenu.
- Press to select the highlighted parameter

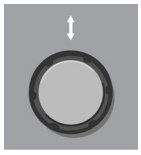


Press to exit the Matrix screen, submenu, or the Setup menu.



Press to move up in the menu or Matrix screen.

Press to move down in the menu or Matrix screen.



- Rotate the knob to move the menu cursor up and down or to change a value or condition in a menu.
- Rotate to move to the corresponding box up or down in the Matrix screen.

- Rotate the knob to move forwards or backwards in the menu.
- Rotate to select the previous or next box in the Matrix screens.

- Rotate the knob to move the menu cursor up and down or to change a value or condition in a menu.
- Rotate to move to the corresponding box up or down in the Matrix screen.

Setup Menu and Alarm Tables

The following tables make up the global setup menu. "(Default)" is shown next to each of the default menu selections. The Setup menu items are listed in **Table 4-1** with the Table and Description Pages:

Table 4-1. Setup Menu Tables

Setup Menu Item	Table Page	Description Page
Video Format	4-3	4-11
Waveform Setup	4-3	4-11
Vector Setup	4-3	4-12
Audio Setup	4-4	5-13*
Audio Alarms	4-6	5-2*
Video Alarms, Digital	4-7	5-2*
Video Alarms, Analog	4-8	5-2*
Display Setup	4-9	4-16
Communications	4-10	4-17
System	4-10	4-19
About	4-10	4-22

***NOTE**: The alarm descriptions are in Section 5 ♦ Alarm Descriptions.

Table 4-2. Video Format Menu

VIDEO A CONFIGURE	AUTODETECT (Default)	-
	625/50	-
	525/59.94	-
VIDEO B CONFIGURE	AUTODETECT (Default)	-
	625/50	-
	525/59.94	-
VIDEO C CONFIGURE	AUTODETECT (Default)	-
	NTSC	-
	PAL	-
VIDEO D CONFIGURE	AUTODETECT (Default)	-
	NTSC	-
	PAL	-

Table 4-3. Waveform Setup Menu

DIGITAL WAVEFORM GRATICULE	PERCENT
	VOLTS (Default)
NTSC PEDESTAL	OFF
	ON (7.5 IRE) (Default)
PAL WAVEFORM SCALE	UNITS (Default)
	VOLTS
DC RESTORE	OFF
	ON (SLOW) (Default)
WAVEFORM INTENSITY	25% TO 200% (100% NORMAL)
WAVEFORM CONTRAST	25% TO 200% (100% NORMAL)
PERSISTENCE	NORMAL, 1 TO 6 & INFINITE (NORMAL is Default)
ATTACK	LOW, 2 TO 6, and MAX (LOW is Default)

Table 4-4. Vector Setup Menu

PAL OVERLAY	NORMAL (Default)
	OVERLAY
SD I/Q LINES	OFF (Default)
	ON
VECTOR INTENSITY	25% TO 200% (100% is NORMAL)
VECTOR CONTRAST	25% TO 200% (100% is NORMAL)
PERSISTENCE	NORMAL, 1 TO 6, & INFINITE (NORMAL is Default)
ATTACK	LOW, 2 TO 6, MAX (LOW is Default)

Table 4-5. Audio Setup Menu

CONFIGURE INPUT(S) A, B, C, or D	**AUDIO TYPE**	ANALOG	-	-
		AES/EBU (Default)	-	-
		EMBEDDED (A and B only)	-	-
	AUDIO DISPLAY	2 CHANNELS	-	-
		4 CHANNELS (Default)	-	-
		4 CHANNEL SETUP	M-1 SUM & DIFF	-
			M-2 SUM & DIFF	-
	INPUT MAPPING	**ANALOG**	**BAR TO INPUT MAP**	MATRIX SCREEN
		AES/EBU	**BAR TO INPUT MAP**	MATRIX SCREEN
		EMBEDDED (INPUTS A and B ONLY)	**BAR TO INPUT MAP**	MATRIX SCREEN
METER SETUP	**REF LEVEL ANALOG (dBm)**	-10 TO +12 (1 dB STEPS) (0 is the Default)	-	-
	REF LEVEL DIGITAL (dBFS)	-22 TO –8 (1 dB STEPS) (-20 is the default)	-	-
	PEAK PROGRAM LEVEL ANL (ANALOG)	**TYPE I**	1 TO 11 dB (8 dB is Default)	-
		TYPE IIa	1 TO 11 dB (8 dB is Default)	-
		TYPE IIb	1 TO 11 dB (8 dB is Default)	-
		TYPE I + 8	1 TO 19 dB (8 dB is Default)	-
		NORDIC	1 TO 11 dB (6 dB is Default)	-
		DIN 45406	1 TO 13 dB (8 dB is Default)	-
	PEAK PROGRAM LEVEL DIG (DIGITAL)	**TYPE I**	1 TO 11 dB (8 dB is Default)	-
		TYPE IIa	1 TO 11 dB (8 dB is Default)	-
		TYPE IIb	1 TO 11 dB (8 dB is Default)	-
		TYPE I + 8	1 TO 19 dB (8 dB is Default)	-
		NORDIC	1 TO 11 dB (6 dB is Default)	-

(Table continues on next page)

Table 4-5. Audio Setup Menu (*continued*)

METER SETUP (CONT)	**PEAK PROGRAM LEVEL DIG (DIGITAL) (CONT)**	**DIN 45406**	1 TO 13 dB (8 dB is Default)	-
		dBFS	1 TO 21 dB (10 dB is Default)	-
		ZERO REF dBFS	1 TO 21 dB (9 dB is Default)	-
	ANALOG SCALE	TYPE I (Default)	-	-
		TYPE IIa	-	-
		TYPE IIb	-	-
		TYPE I + 8	-	-
		NORDIC	-	-
		DIN 45406	-	-
	DIGITAL SCALE	TYPE I	-	-
		TYPE IIa	-	-
		TYPE IIb	-	-
		TYPE I + 8	-	-
		NORDIC	-	-
		DIN 45406	-	-
		dBFS (Default)	-	-
		ZERO REF dBFS	-	-
	METER RESPONSE	VU (Default)	-	-
		PEAK	-	-
		TRUE PEAK	-	-
		VU + PEAK	-	-
		VU + TRUE PEAK	-	-
	PEAK HOLD	**PEAK HOLD TIME**	OFF (Default)	-
			1 TO 10 SECONDS	-
			INFINITE	-
		RESET PEAK	PRESS SETUP/ENTER	-
	LISSAJOUS SETUP	**LISSAJOUS INTENSITY**	25% TO 200% (NORMAL/100% is DEFAULT)	-
		LISSAJOUS CONTRAST	25% TO 200% (NORMAL/100% is DEFAULT)	-
		PERSISTENCE	NORMAL, 1 TO 6, INFINITE (NORMAL is the Default)	-

(Table continues on next page)

Table 4-5. Audio Setup Menu (*continued*)

METER SETUP (CONT)	**LISSAJOUS SETUP (CONT)**	**ATTACK**	LOW, 2 TO 6, MAX (LOW is the Default)	-
		AGC	OFF (Default)	-
			ON	-
	LISSAJOUS DISPLAY	SOUNDSTAGE (Default)	-	-
		X-Y	-	-
	CONFIGURE PHASE BAR(S)	**POLARITY**	NORMAL (Default)	-
			REVERSE	-
		DAMPING	FAST, 1 TO 10, SLOW (FAST is Default)	-
AES VALIDITY BIT	DISABLED (Default)	-	-	-
	ENABLED	-	-	-
OUTPUT PREFERENCES	**ANALOG OUTPUT LEVEL**	**ANALOG INPUT**	-50 dB TO +6 dB (0 is the Default)	-
		DIGITAL INPUT	-50 dB TO +6 dB (0 is the Default)	-

Table 4-6. Audio Alarms Menu

PEAK AUDIO	**ANALOG**	ENABLE CH 1	-
		ENABLE CH 2	-
		ENABLE CH 3	-
		ENABLE CH 4	-
		ANALOG LEVEL	-6 TO 24 dBu (24 dBu is Default)
		DURATION	0 TO 60 SECONDS (2 Seconds is Default)
	DIGITAL	ENABLE CH 1	-
		ENABLE CH 2	-
		ENABLE CH 3	-
		ENABLE CH 4	-
		DIGITAL LEVEL	-30 TO 0 dBFS (-10 dBFS is Default)
		DURATION	0 TO 60 SECONDS (2 Seconds is Default)

(Table continues on next page)

Table 4-6. Audio Alarms Menu (continued)

LOSS OF SOUND	**ANALOG**	ENABLE CH 1	-
		ENABLE CH 2	-
		ENABLE CH 3	-
		ENABLE CH 4	-
		ANALOG LEVEL	-50 TO 0 dBu (-50 dBu is Default)
		DURATION	0 TO 60 SECONDS (2 Seconds is Default)
	DIGITAL	ENABLE CH 1	-
		ENABLE CH 2	-
		ENABLE CH 3	-
		ENABLE CH 4	-
		DIGITAL LEVEL	-60 TO 0 dBFS (-60 dBFS is Default)
		DURATION	0 TO 60 SECONDS (2 Seconds is Default)

Table 4-7. Video Alarms, Digital Menu

LOSS OF CARRIER	**ENABLE**	OFF (Default)	-
		ON	-
	DURATION	0 TO 60 Seconds (2 Seconds is Default)	-
DIGITAL GAMUT	**RGB GAMUT UPPER**	**ENABLE**	OFF (Default)
			ON
		THRESHOLD	650 TO 750 mV (710 mV is Default)
		SENSITIVITY	1 TO 20 CES (15 CES is Default)
		DURATION	0 TO 60 Seconds (2 Seconds is Default)
	RGB GAMUT LOWER	**ENABLE**	OFF (Default)
			ON
		THRESHOLD	-50 TO 50 mV (-10 mV is Default)
		SENSITIVITY	1 TO 20 CES (15 CES is Default)
		DURATION	0 TO 60 SECONDS (2 Seconds is Default)
EDH	**ENABLE**	OFF (Default)	-
		ON	-
	DURATION	0 TO 60 Seconds (2 Seconds is Default)	-

Table 4-8. Video Alarms, Analog Menu

LOSS OF SIGNAL	**ENABLE**	OFF (Default)	-
		ON	-
	DURATION	0 TO 60 SECONDS (2 Seconds is Default)	-
SC/H PHASE	**ENABLE**	OFF (Default)	-
		ON	-
	RANGE	5 TO 89 DEGREES (20 DEGREES is Default)	-
	DURATION	0 TO 60 SECONDS (2 SECONDS Default)	-
ANALOG GAMUT	**PEAK UPPER**	ENABLE	-
		THRESHOLD NTSC	50 TO 140 IRE (120 IRE is Default)
		THRESHOLD PAL	▪ 51 UNITS TO 143 UNITS (136 UNITS is Default) ▪ 357 to 1000 mV (951 mV is Default)
		SENSITIVITY	1 CES to 20 CES (2 CES is Default)
		DURATION	0 TO 60 SECONDS (2 SECONDS is Default)
	PEAK LOWER	ENABLE	-
		THRESHOLD NTSC	-40 TO 0 IRE (-20 IRE is Default)
		THRESHOLD PAL	▪ -41 UNITS TO 0 UNITS (-34 UNITS is Default) ▪ -285 to 0 mV (-238 mV is Default)
		SENSITIVITY	1 CES to 20 CES (2 CES is Default)
		DURATION	0 TO 60 SECONDS (2 SECONDS is Default)

Table 4-9. Display Setup Menu

DISPLAY COLORS	MATRIX SCREEN (See Table 4-10 on page 4-9 for the Display Colors Menu)	-	-
GRATICULE INTENSITY	25% TO 200% (100% is NORMAL)	-	-
MONITOR	**SCREEN SAVER**	OFF (Default)	-
		1 TO 60 MIN	-
	OUTPUT LEVEL	1V p-p (Default)	-
		0.7V p-p	-
TIME CODE	**ENABLE**	OFF (Default)	-
		ON	-
	POSITION	TOP	-
		MIDDLE (Default)	-
		BOTTOM	-

Table 4-10. Display Colors Menu

Display Colors	INA	INB	INC	IND	GRAT	BKGD
Black	N/A	N/A	N/A	N/A	N/A	X
Blue	X	X	X	X	X	X
Green	X	X	X	X	X	N/A
Cyan	X	X	X	X	X	X
Red	X	X	X	X	X	N/A
Purple	X	X	X	X	X	X
LT Gray	X	X	X	X	X	X
DK Gray	X	X	X	X	X	X
LT Blue	X	X	X	X	X	X
LT Green	X	X	X	X	X	X
LT Cyan	X	X	X	X	X	X
LT Red	X	X	X	X	X	X
LT Purple	X	X	X	X	X	X
Yellow	X	X	X	X	X	X
White	X	X	X	X	X	X

Table 4-11. Communications Setup Menu

RCU PORT	**TERMINATION**	OFF (Default)	-
		ON	-
IP CONFIGURATION	ETHERNET CONFIG SCREEN	-	-
GPI OUTPUT FUNCTION	**ALARM GPI OUTPUT**	OFF (Default)	-
		ON	-
	GPI OUTPUT POLARITY	NORMALLY OPEN (Default)	
		NORMALLY CLOSED	-
UNIT ID	1 TO 99 (1 is Default)	-	-

Table 4-12. System Setup Menu

PANEL LOCKOUT	**ENTER PASSWORD**	SCREEN LOCK/UNLOCK FRONT PANEL PRESETS	-
CHANGE PASSWORD	**ENTER PASSWORD**	ENTER PASSWORD	-
SET TIME	ENTER NEW TIME SCREEN	-	-

Table 4-13. About Menu

ABOUT	ABOUT SCREEN	-	-

Video Format Menu

The Video Format menu items are described below.

Video A, B, C, or D Configure

The Video "A, B, C, D" Configure menu is used to automatically or manually select the video format reference standard for the selected input. The format selection determines the unit of measure and the critical amplitude limits for the input. The default selection, AUTODETECT, is used to automatically detect the format of the input signal.

Waveform Setup Menu

The Waveform Setup menu is described below.

Digital Waveform Graticule

The Digital Waveform Graticule menu is used to select the unit of measurement for the digital waveform. The selections are Volts or Percent. The default selection for the Digital Waveform Graticule menu is VOLTS.

NTSC Pedestal (or 7.5 IRE Setup)

When in NTSC Composite format, set the NTSC PEDESTAL to OFF if using a 0 IRE pedestal signal. When set to OFF, the Vector graticules change to the proper levels in order to display an NTSC signal without 7.5 IRE setup. The NTSC PEDESTAL default position is ON (7.5 IRE).

PAL Waveform Scale

The PAL Waveform scale menu is used to select the unit of measurement for the PAL Waveform. The selections are Volts or Units. The default selection for the PAL Waveform menu is UNITS.

DC Restore

DC Restore is used to remove the DC voltage of the analog signal in order to maintain a DC level on the waveform. The DC Restore selections are Off and On (slow).

- Off = DC offset appears.
- On Slow = DC offset removed.

Waveform Intensity

The Waveform Intensity is used to raise or lower the brightness of the displayed waveform. The range of intensity is 25% to 200%. NORMAL is the default intensity setting.

Waveform Contrast

Waveform Contrast is used to adjust the overall difference between the lightest and darkest colors of the waveform. The range of contrast is 25% to 200%. NORMAL (100%) is the default contrast setting.

Persistence

Persistence is used to determine how long a data point (pixel) in the waveform remains on the display. The ranges of Persistence is NORMAL, 1 TO 6, and INFINITE. NORMAL is the default setting.

Attack

Attack is the initial intensity that the data point (pixel) appears in the display. The range of attack is LOW, 2 to 6, and MAX. LOW is the default setting.

Vector Setup Menu

The Vector Setup menu is used to select the PAL Overlay, SDI I/Q Lines, Vector Intensity, Vector Contrast, Persistence, and Attack.

PAL Overlay

A PAL signal by default appears in parade mode. The PAL Overlay menu is used to determine if the PAL signal should be in Normal or Overlay mode.

Normal mode is used to display the phase difference between the bursts. Overlay mode is used to display the burst to the Phase reference. When in Overlay mode, bursts will be in Phase.

SD I/Q Lines (Component Vector Only)

The SD I/Q Lines submenu is used to turn OFF and ON the I and Q marker lines on the Vector Display. The default condition is OFF. The I and Q lines always appear on Analog NTSC.

Vector Intensity

The Vector Intensity is used to raise or lower the brightness of the displayed vector. The range of intensity is 25% to 200%. Normal (100%) is the default.

Vector Contrast

Vector Contrast is used to adjust the overall difference between the lightest and darkest colors of the vector. The range of contrast is 25% to 200%. Normal (100%) is the default.

Persistence

Persistence is used to determine how long a data point (pixel) in the vector remains on the display. The range of Persistence is NORMAL, 1 TO 6, and INFINITE. NORMAL is the default setting.

Attack

Attack is the initial intensity that the data point (pixel) appears in the display. The range of attack is LOW, 2 to 6, and MAX. LOW is the default setting.

Audio Setup Menu

Configure Inputs

The Configure Inputs menu is used to setup the audio for inputs A, B, C, and D.

Audio Type

The Audio Type menu is used for one of three audio types. The three audio types are:

- **ANALOG**
- **AES/EBU** - A digital audio standard established jointly by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).
- **EMBEDDED** - Digital audio information multiplexed onto a serial digital data stream. Up to sixteen channels can be multiplexed on a single stream of 601 video, minimizing cabling and routing requirement.

Audio Display

The VTM-2000 instrument is capable of displaying analog or digital audio. To take advantage of this flexibility, use the AUDIO SETUP menu to select specifications unique to the studio environment.

Configure the audio display type and parameters using the AUDIO SETUP CONFIGURE INPUT A to D submenu. Audio can be displayed as:

- **2 Channels**: One vertical 2 channel bar graph with 1 Lissajous and 1 Phase bar
- **4 Channels**: Two vertical 2 channel bar graphs (for a total of 4 channels) with 2 Lissajous and 2 Phase bars

Input Mapping

The Input Mapping is used to assign the meter to the input. When selected, the MATRIX screen appears. Turn the NAVIGATION knobs to move around the Matrix, and press the ENTER button to assign an input to a meter. Separate Mapping schemes can be made for the BAR TO INPUT MAP for each audio type. Only one input can be assigned to a meter, but multiple meters can be assigned to an input.

Meter Setup

The Meter Setup submenu is used to select the response, ballistics, and other meter features.

Ref Level Analog

The Ref Level Analog setting is used to set the reference level on the meters for an analog signal. Content below this setting is green. Content above this setting is yellow.

Ref Level Digital

The Ref Level Digital setting is used to set the reference level on the meters for a digital signal. Content below this setting is green. Content above this setting is yellow.

Peak Program Level Analog and Digital

Analog and Digital Peak Program Level is a range set for each scale type that shows red when the audio level exceeds this range. The range starts at the set reference level and changes in 1 dB increments.

Analog and Digital Scales

The Analog and Digital Scales submenus are used to determine the type of scale that appears on the audio meter display.

Meter Response

Ballistics specifications are shown in **Table 4-14**. These specifications describe meter scale markings and both attack and decay times for meter movement.

Table 4-14. Ballistic Specifications with Attack and Decay

Ballistic Name	Standard	Attack	Decay
VU	IEC 268-17	300 ms	300 ms
PEAK	IEC 268-10	10 ms	1.7 sec
TRUE PEAK	IEC 268-10	0 ms	1.7 sec

The audio scales and ballistics are based on the IEC 268-10 and IEC 268-17 standards. These standards describe meter scale markings and both attack and decay times for meter movement.

The following meter responses can be selected:

- VU (NORMAL)
- PEAK
- TRUE PEAK
- VU + PEAK
- VU + TRUE PEAK

PK (Peak) Hold

PK (PEAK) HOLD TIME is a user-selectable duration value of OFF, 1 to 10 seconds, or infinite. The duration only applies to the hold time of the PEAK value, not the attack or decay time. RESET PEAK manually resets the Peak value.

Lissajous Setup

The Lissajous display is a display of the amplitude and phase relationships between two input signals. The Lissajous Setup is used to set the lissajous intensity, lissajous contrast, persistence, attack, and enable or disable Automatic Gain Control (AGC).

AGC, when enabled, is used to automatically adjust the gain setting in the Lissajous and Phase displays. Otherwise, the Lissajous display contains a fixed gain mode. AGC keeps the lissajous pattern within the bounds for signal levels from –50 dBFS to 0 dBFS.

Lissajous Display

Select to determine the type of Lissajous display that appears in the Audio pane. There are two types of Lissajous displays (Soundstage and X-Y). The soundstage selection displays a lissajous, which is rotated so that the in-phase signals appear on the vertical axis and out of phase signals appear on the horizontal axis.

X-Y displays a lissajous with the left channel mapped to the vertical axis, and the right channel mapped to the horizontal axis.

Configure Phase Bar(s)

The phase bar monitors the instantaneous phase relationship between two audio channels. A properly phased stereo pair produces a phase pointer (yellow mark framed in black) that moves within the green zone, whereas a reversed channel produces a pointer that moves within the red zone. The phase bar polarity can be set to Normal or Reverse.

Damping

The effect of higher damping in a phase meter is to show an averaged rather than a peak value of phase. The Phase Bar Damping in the AUDIO SETUP\METER SETUP\CONFIGURE PHASE BARS\DAMPING can be set from FAST, 1 to 10, and SLOW.

AES Validity Bit

The AES Validity Bit is used to detect PCM (pulse code modulation) audio or non-PCM audio. Non-PCM audio can include Dolby or the digital data.

Output Preferences

The Output Preferences is used to determine what level is output from the audio option.

Analog Output Level

The output audio level can be adjusted from -50 dB to +6 dB for analog and digital inputs independently.

The default output level for a -20 dBFS digital input produces a +4 dBm analog output level (600Ω). For example, when applying a gain adjustment of +6 dB to the output

with a -20 dBFS input signal, the audio output level will be +10 dBm into a 600Ω termination. The Audio Output Level adjustment default is 0 dB.

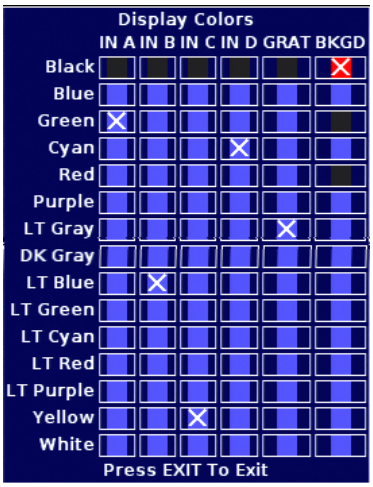
Display Setup

The Display Setup menu is used to configure the Display colors, graticule, monitor, and time code.

Display Colors

The display colors are used to select the colors for the background, signals, and graticules of the VTM-2000. The colors are listed in **Table 4-10** on page 4-9. The Display Color Selection Screen, shown in **Figure 4-1**, is used to set the colors. Any color selection that is not available is blocked out and not selectable. "X" indicates the selection on the screen.

Figure 4-1. Display Color Selection



Use the NAVIGATION knobs to select the cell for the color and function. Once selected, press the SETUP/ENTER button to assign the color to that function. Though the same color can be used for multiple functions, each function can use only one color. Black cells in the Display Color Screen indicate color selections that can not be made for specific functions.

NOTE: The background color is selectable. There is a 50% reduction in the luminance level of the background relative to the same color of other attributes (e.g. text or graticules). This is to assure a contrast when the background color selection is the same, such as red enabled alarms over a red background.

Graticule Intensity

The Graticule Intensity submenu is used to raise or lower the brightness of the displayed graticule.

Monitor

The monitor menu is used to select the screen saver and output level for the monitor.

Screen Saver

The screen saver is used to provide a blank screen after there is no activity for the specified duration. The time it takes for the screen saver to activate can range from 1 to 60 minutes. OFF disables the screen saver. When the screen saver is activated, press any button to turn the display back on.

Output Level

The Output Level submenu is used to determine the monitor output level. The default monitor output level is 1V p-p. The other output level selection is 0.7V p-p.

Time Code

Time Code is used to display the Time Code on the right side of the picture. The Time Code can be displayed on the Top-right, Middle-right, or Bottom-right side of the picture.

Communications Setup

The Communications Setup menu is used to configure the communication between the VTM-2000 and any peripheral hardware and Software connected to the unit.

RCU Port

The RCU Port submenu controls the termination for the Remote Port on the back of the VTM-2000.

Termination

One RCU-2000 connects to multiple VTM-2000 instruments using a multidrop straight through wire with RJ-11 connectors (not a standard telephone wire) that connects to the REMOTE ports on the back of the VTMs and to the TO MAIN UNIT connector on the back of the RCU. All VTMs must have unique unit IDs, as described in Unit ID on page 4-19. The REMOTE port must be terminated on the last VTM-2000 using this menu.

IP Configuration

The IP CONFIGURATION menu is used to configure the VTM-2000 for Ethernet communication. The Ethernet interface provides a high-speed communication link to the VFlash application over standard LAN and Internet networks. The interface conforms to industry Ethernet standards:

- Connection via a standard RJ45 socket
- Automatic detection and switching between 10BaseT and 100BaseT
- TCP/IP stack is fully compliant with RFC2500, “Internet Official Protocol Standards”
- Fully compliant with the IEEE 802.3 Ethernet standard

The interface can accept a static IP address, or it can obtain an IP address dynamically from a DHCP server. The IP Address, Subnet Mask, Gateway Address, and DHCP are

programmable from the IP Configuration menu. The settings are performed in the IP Configuration matrix screen.

IP Address

The IP Address is used to select a static IP address (unless Dynamic Host Configuration Protocol (DHCP) will be used). The IP address must not be the same address as another instrument or PC on the network. Network conflicts will occur if two devices have the same IP address. See the System Administrator to determine a static IP address that will avoid conflicts.

Subnet Mask

The Subnet Mask is used to configure the Subnet Mask on a network if DHCP is not enabled. If DHCP is not used to automatically detect the Subnet Mask on a network, the Subnet Mask must be manually configured. Unlike the IP address, the Subnet Mask must be the same Subnet Mask as the network Subnet Mask. See the System Administrator to determine the Subnet Mask.

Gateway

The Gateway is the network address that provides access to an outside network. Use the Gateway submenu to configure the Gateway on a network if DHCP is not enabled. If DHCP is not used to automatically detect the Gateway on a network, the Gateway must be manually configured. Unlike the IP address, the Gateway must be the same Gateway address as the network Gateway address. See the System Administrator to determine the Gateway address.

DHCP

The Dynamic Host Configuration Protocol (DHCP) function is used to have the VTM-2000 automatically configure an IP Address, Subnet Mask, and Gateway every time the unit is powered on. The IP Address is dynamic and could change each time the VTM-2000 is powered on. DHCP Enable is set to OFF by default.

GPI Output Function

The GPI Output Function submenu is used to enable the GPI OUTPUT and determine the GPI OUTPUT POLARITY.

Alarm GPI Output

The Alarm GPI Output submenu is used to enable the GPI output to activate upon an alarm condition.

GPI Output Polarity

There is one GPI output that is associated with a list of alarms. All GPI alarm activation selections are set to the default OFF until the alarm is enabled. When an alarm is enabled, the GPI functions according to the GPI OUTPUT POLARITY setting (NORMALLY OPEN, NORMALLY CLOSED). The default polarity is NORMALLY OPEN.

- **NORMALLY OPEN**: The contact closure on the GPI board is normally open. When the contact closure closes, the GPI alarm is activated.
- **NORMALLY CLOSED**: The contact closure on the GPI board is normally closed. When the contact closure opens, the GPI is activated.

Unit ID

The unit ID is the identification number of the VTM-2000. It can be set to any number within a range of 1 to 99 and should be different than the identification numbers of other units in the same system configuration.

System Setup Menu

The System Setup menu is used to control the system configuration selections.

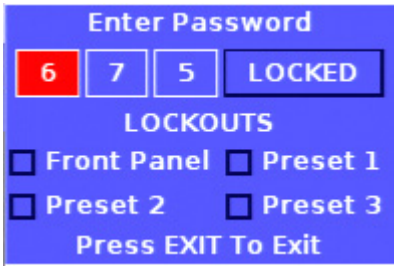
Panel and Preset Lockout

The Panel Lockout feature is used to disable front panel control until the proper password is entered. The Preset Lockout feature, located within the Panel Lockout menu, is used to prevent storing settings in selected presets.

Similar to the Panel Lockout feature, the Preset Lockout is also password protected. When a user locks a preset configuration into the VTM-2000, it will not be able to be altered until the password is entered. The Front Panel and Presets are locked and unlocked using the Password screen, shown in **Figure 4-2**.

NOTE: The default password is 0-0-0.

Figure 4-2. Enter Password Screen



To lock or unlock the presets or front panel:

NOTE: Once Front Panel is selected to be locked out, the front panel is locked. Press the SETUP/ENTER button to enter the password to return to the Setup menu.

1. Press the SETUP/ENTER button to display the SETUP MENU.

2. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to move the cursor to the SYSTEM menu.
3. Press the SETUP/ENTER button.
4. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to move the cursor to PANEL LOCKOUT.
5. Press the SETUP/ENTER button. The Enter Password screen appears.
6. Use the UP and DOWN NAVIGATION buttons to select 0-9 (first digit in password).
7. Use the SETUP/ENTER button to move the cursor to select the second password number.
8. Use the UP and DOWN NAVIGATION buttons to select 0-9 (second digit in password).
9. Use the SETUP/ENTER button to move the cursor to the third password number.
10. Use the UP and DOWN NAVIGATION buttons to select 0-9 (third digit in password). When the password is correctly entered, LOCKED will change to UNLOCK.
11. Press the SETUP/ENTER button to move the cursor to select UNLOCK.
12. Press the SETUP/ENTER button.
13. Use the UP and DOWN NAVIGATION buttons to move the cursor to select the Preset Number or front panel.
14. Press the SETUP/ENTER button to toggle between Lock and Unlock on the highlighted Preset Number selection or front panel.
15. Repeat the previous two steps for any other selection needed to be made.
16. After the settings are complete, press the EXIT button to exit the menu.

(If the front panel was locked in the steps above) The front panel is locked once EXIT is pressed. Any button pressed besides the SETUP/ENTER button will invoke the PANEL LOCKED OUT message. Subsequent presses of the SETUP/ENTER button will invoke the ENTER PASSWORD setup screen. The panel will be unlocked and the Setup menu can only be accessed after a valid password has been entered.

To unlock the locked front panel or preset:

NOTE: The default password is 0-0-0.

1. Press the SETUP/ENTER button until the Enter Password Screen appears.
2. Use the UP or DOWN buttons to select 0-9 (first digit in password).
3. Use the SETUP/ENTER button to move the cursor to the second password number.
4. Use the UP or DOWN buttons to select 0-9 (second digit in password).
5. Use the SETUP/ENTER button to move the cursor to the third password number.
6. Use the UP or DOWN buttons to select 0-9 (third digit in password). When the password is correctly entered, LOCKED will change to UNLOCK.

7. Press the SETUP/ENTER button to select UNLOCK and press the SETUP/ENTER again button to unlock the front panel. Press EXIT at any time to keep the front panel locked.

To change the password:

NOTE: The default password is 0-0-0.

1. Press the SETUP button to display the SETUP menu.
2. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to move the cursor to the COMMUNICATION SETUP menu.
3. Press the SETUP/ENTER button.
4. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to move the cursor to CHANGE PASSWORD.
5. Press the SETUP/ENTER button. The Enter Password screen appears.
6. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to select 0-9 (first digit in the current password).
7. Use the SETUP/ENTER button to move the cursor to the second password number.
8. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to select 0-9 (second digit in the current password).
9. Use the SETUP/ENTER button to select the third password number.
10. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to move the cursor to select 0-9 (third digit in the current password). When the correct password is entered, LOCKED changes to UNLOCK.
11. Use the SETUP/ENTER button to move the cursor to UNLOCK.
12. Press the SETUP/ENTER button. The Enter New Password screen appears. It is time to ENTER A NEW PASSWORD.
13. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to select 0-9 (first digit in the new password).
14. Use the SETUP/ENTER button to move the cursor to the second password number.
15. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to select 0-9 (second digit in the new password).
16. Use the SETUP/ENTER button to move the cursor to the third password number.
17. Use the UP or DOWN buttons (or the UP/DOWN NAVIGATION knob) to select 0-9 (third digit in the new password).
18. Use the SETUP/ENTER button to move the cursor to select ACCEPT.
19. Press the SETUP/ENTER button. The new password has been set.

Set Time

When selecting Set Time, the Enter New Time Screen, shown in **Figure 4-3**, appears. The Enter New Time screen is used to set the internal clock of the unit. Press the UP and DOWN buttons (or rotate the UP/DOWN NAVIGATION knob) to change the

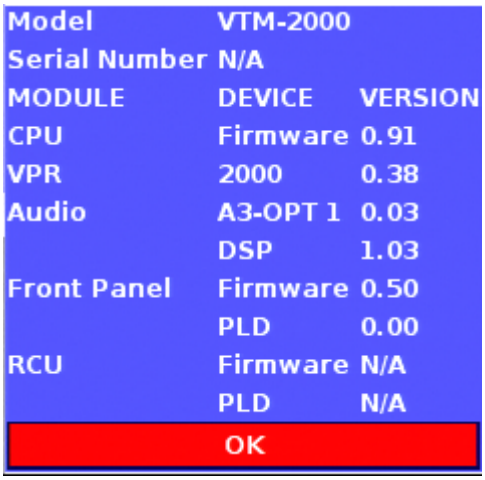
values of each time selection. Press the SETUP/ENTER button (or rotate the LEFT/RIGHT NAVIGATION knob) to move between the Hour, Minute, Second, Month, Day, Year, ACCEPT, and CANCEL selections. Once the internal date and time is entered, press the SETUP/ENTER when the ACCEPT button is highlighted to save the settings.

Figure 4-3. Enter New Time Screen

About

The About Screen, shown in **Figure 4-4**, contains the model, serial number, module, device, and version. Press the EXIT or SETUP/ENTER, or turn the LEFT/RIGHT control knob to exit from the screen.

Figure 4-4. About Screen



Section 5 ♦ Alarm Descriptions

Setting Alarms

Limits are selected in the SETUP Menu by choosing a value using the UP/DOWN or CURVED ARROW knobs, or the UP or DOWN Navigation buttons.

Sensitivity and Duration are two general terms used in the alarm menus:

- Sensitivity

  Sensitivity is set by Consecutive Errored Samples (CES). When setting amplitude limits, a noise spike can exceed the limit while the video amplitude can be within the limit. With the CES set to a low number, a spike is detected and an alarm is displayed. Set the CES to a higher number to ignore the fast spike. Each CES occurs at 37ns intervals for SD. Use this as a guideline to select the appropriate CES value.

  Not all alarms have CES associated with them; in such cases, use the duration to increase or decrease the general sensitivity.

- Duration

  This value is used to determine how long an error must persist before it is reported. Set the duration to 0 to cause an error to be displayed as soon as the CES value is met.

Audio Alarms

Peak Audio

The Peak Audio alarm occurs when the peak audio level exceeds the adjustable limit for a period in excess of the duration setting.

Loss of Sound

The Loss of Sound alarm occurs when the peak amplitude falls below an adjustable ANALOG or DIGITAL LEVEL for a period in excess of the duration setting. This alarm is valid for the displayed input (analog, AES/EBU, or embedded). The alarm is global and independent of the scale type or input format.

Video Alarms Digital Descriptions

The Video Alarms Digital menu contents are listed below.

Loss of Carrier

The Loss of Carrier alarm occurs when there is no TRS (Timing Reference Signal) detected.

Digital Gamut

RGB Upper/Lower

The RGB Upper and Lower alarm occurs when any component of the transcoded RGB signal falls outside the upper or lower limits for a period in excess of the duration setting. The Sensitivity can be increased to provide immunity to fast transcoding spikes.

EDH

Per SMPTE RP 165-1994; the EDH alarm occurs when one or more errors are detected for a period in excess of the duration setting.

Video Alarms Analog Descriptions

The Video Alarms Analog menu contents are listed below.

Loss of Signal

The Loss of Signal alarm occurs when no sync signal is detected for a period in excess of the duration setting.

SC/H Phase

The SC/H Phase alarm occurs when the phase angle of burst compared to the 50% point of the leading edge of horizontal sync on line 10 of field 1 (NTSC) or line 1

(PAL) exceeds the range setting for a period in excess of the duration setting. The range is ± 5° to 89° in NTSC.

Analog Gamut

The Analog Gamut menu consists of the Peak Upper and Peak Lower submenus.

Peak Upper

The Peak Upper Analog alarm occurs when active video falls outside the upper limit for a period in excess of the duration setting. Peak video includes luminance and/or chrominance.

Peak Lower

The Peak Lower Analog alarm occurs when active video falls outside the lower limit for a period in excess of the duration setting. Peak video includes luminance and/or chrominance.

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Section 6 ♦ Troubleshooting

CAUTION — these instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

NOTE: When power is applied to the unit, the display shows the startup screen for about 25 seconds.

If the VTM-2000 is not functioning properly, first verify that:

- The VTM-2000 is connected to a power source (90–264 VAC, 50/60 Hz nominal).
- All cables are correctly connected (see Section 2, "Installation").

Initial difficulties with operation or display can be due to improper setup. Review the operation was correct to ensure that the proper adjustments have been made for the signal requirements.

Cold Starting the VTM-2000

NOTE: A cold start resets all front panel and Setup menu selections to the factory-default settings. All user settings are lost.

If a problem persists after the cables are correctly connected and the unit is set up, perform a Cold Start. Three procedures can cold start the VTM-2000. Only one procedure needs to be performed to cold start the unit. The first type of cold start procedure is a front panel Cold Start, as described below. The second type of cold start procedure is a Warm Start that is described on page 7-2. The third type of cold start is a Cold Start after a VFlash update that is described on page 7-2.

The Ethernet default settings for the VTM-2000 are:

- IP: 192.0.0.100
- Subnet Mask: 255.255.255.192
- Gateway: 0.0.0.0

Cold Start

The Front Panel Cold Start procedure is a cold starting procedure that does not require the power to be disconnected from the unit. To perform a Front Panel Cold Start:

1. Push and hold the EXIT button, PRESET button, and DOWN button. For a minimum of five seconds. The Cold Start message appears on the screen.
2. Once the message appears, the cold start is complete.

Warm Start

The Warm Start procedure is similar to a cold start. This reset will perform a cold start on the unit, but will not erase the Presets from memory. To perform a Warm Start:

1. Push and hold the EXIT button and PRESET buttons for a minimum of five seconds until the Warm Start message appears on the display.
2. Once the message appears, the Warm start is complete.

Cold Start after VFlash

After a VFlash update is performed, cycle the power and perform a cold start to continue. To perform a Cold Start after a VFlash update:

1. Turn off the power to the VTM-2000 device and wait 30 seconds.
2. Turn on the power for the device while pushing and holding the EXIT button, PRESET button, and DOWN button. Hold the buttons until the display appears.
3. Once the quad display appears, the cold start is complete.

Updating with VFlash

The VTM-2000 is updated using the VFlash program. Obtain the latest .flu file from www.videotek.com and follow the instructions in the *VFlash User Guide* located on the VFlash CD to update the device.

Problems, Causes, and Solutions

Table 6-1. VTM-2000: Problems, Causes, and Solutions

Problem/Symptom	Possible Cause	Solution or Explanation
No display on external XGA monitor	The monitor is not powered up.	Check to see that the monitor is plugged in and powered up.
	The full-screen picture display is selected but no signal is present on the input selected.	Press FULL to de-select the full-screen picture display.
Display on External XGA monitor is not centered	The XGA monitor is not correctly adjusted.	Use the monitor controls to center the display.
Waveform not locked when External Reference (EXT REF) is selected	The video signal is too low in amplitude or the sync edge is too noisy.	Verify that the External Reference signal is of sufficient amplitude.
	EXT REF is selected but there is no reference input, or the External Reference is non-synchronous.	Select Internal Reference (INT REF) and/or verify that the External Reference signal is synchronous.
Problems displaying SD inputs	Inputs not terminated.	Terminate Inputs

(Table continues on next page)

Table 6-1. VTM-2000: Problems, Causes, and Solutions (continued)

Problem/Symptom	Possible Cause	Solution or Explanation
Audio level reading too low	The input reference level is not correctly set.	Use the SETUP MENU to check the input reference level setting.
No communications on VFlash port	The IP address is incorrect.	Provide the correct IP address in setup menu.
	Incorrect Ethernet cable.	For a direct connection, use a crossover cable. For a network connection, use a standard Ethernet cable.

If the problem still exists after troubleshooting the VTM-2000, see Section 1, “Service Support,” for further instructions.

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Appendix A ♦ Specifications

Video

Inputs A and B (Digital)	Two (2) dual standards inputs accepting Standard definition, SMPTE 259 M-C formats, including: 525/59.94, 625/50
Data Rate	270 MB/s
Connectors	4 BNCs, Hi-Z passive looping
Level	800 mV, nominal
Input EQ	Up to 200 meters of 8281 at 270 MB/S
Return Loss	≤ -15 dB 5 MHz to 270 MHz
Inputs C and D: (Analog)	Two (2) NTSC/PAL composite video auto detect
Signal Level	1V p-p
Input Impedance	Hi-Z, looping
Return Loss	≤ -45 dB 100 kHz to 5 kHz

Audio

Inputs (Analog)	Four monophonic or two stereo channels, balanced or unbalanced
Maximum Input Level	+24 dBu
Input Connector	37-pin, D-sub, male
Impedance:	> 20kΩ
Inputs (Digital)	Four AES/EBU serial digital pairs. Sixteen embedded audio channels.
Input Connectors	Four, BNC, female
Impedance	75Ω
Outputs (Analog)	Four monophonic or two stereo channels, balanced or unbalanced, follows selected audio input.
Output level	▪ +24 dBu max ▪ +6 to –50 dB adjustable ▪ For digital audio, -20 dBFs produces a +4 dBu analog output level
Output connector	37-pin D-sub, male, shared with inputs
Impedance	10Ω unbalanced or 20Ω balanced, nominal
Signal to noise	100 dB (relative to signal level out of +24 dBu), typical

Control

GPI	Four total for input select A, B, C, and D.
GPO	One summary alarm
Connector	15-pin HD (high density) D-sub, female
Input Impedance	10 kΩ returned to +5 VDC
Alarm Output	Relay closure
Maximum relay current	350 mA @ 30 VDC
Remote	One RJ-11 female for use with the RCU-2000

Display

General	A quadrant display for viewing an input on up to four different displays as picture, waveform, vector, audio, and alarm status simultaneously or individually as a full screen display of each separately
Waveform	Composite. YC_BC_R RGB, or YRGB parade/overlay of like formats
Sweep time base	▪ 1H or 2H with x1, x5, and x10 horizontal magnification ▪ 1V or 2V with x1, x2.5, x5, and x25 horizontal magnification
Waveform accuracy	≤ 1%
Vector	R-Y vs. B-Y for Analog C_B vs. C_R for SD
Vector Accuracy	≤ 1°
Audio (Optional)	2 or 4 channels displayed simultaneously

Time Code

Input	LTC via back panel connector
Display	Displayed in picture

Magnification

Waveform Sweep MAG selection	x1, x5, and x10. Pressing the MAG button will cycle through x1, x5, and x10 horizontal magnification.
Waveform Step Gain selection	x1, x2.5, and x5. Pressing the ZOOM button will cycle through x1, x2.5, and x5 magnification.

VFlash

Standard	10/100 Base-T conforms to IEEE802.3
Connector	RJ-45

Remote Control

Communications	VCP
Number of multidrop inputs	30
Physical interconnection standard	RJ-45

Power Requirements

AC power source	90 – 264 VAC, 50 - 60 Hz, nominal
Power consumption	90 W maximum

Mechanical

Dimensions	▪ Height: 1.75" (4.45 cm) ▪ Width: 19.00" (48.26 cm) ▪ Depth: 15.5" (39.4 cm)
Weight	8.25 lb (3.75 kg)

Environmental

Operating temperature	0° to +50°C
Storage temperature	-40° to +65°C
Humidity	0 to 90% (non-condensing)
Transportation	24" (9.5 cm) impact-drop survivable in original factory packaging

Standard Accessories

Standard accessories	▪ *VTM-2000 Installation and Operation Handbook* ▪ Breakout connector for LTC/GPI ▪ One Rack Mounting Kit ▪ One Power Cord

Options

VTM-A^3-OPT1	Advanced audio analysis option. Display 2 or 4 channels with bar graph and lissajous. 4 mono or 2 stereo analog, 4 AES/EBU and embedded inputs. Analog monitoring output.
RCU-2000	Remote control panel for the VTM-2000 instruments. Replicates all of the front panel controls. RJ-11 connection, includes 50’ (15m) cable with RJ-11 connectors. One RU in height.
TVM-WRTY2	Adds three years to the standard two-year warranty.

Specifications are subject to change without notice.

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Appendix B ♦ Pinouts

Figure B-1. ANALOG AUDIO IN/OUT 37-pin, Male, D-sub Connector For Audio Option

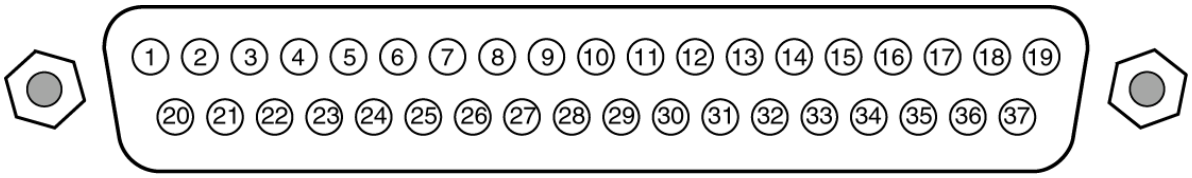


Table B-1. Pinouts for ANALOG AUDIO IN/OUT Connector and Audio Breakout Board

Pinout	Signal
1	Analog input 1 –
2	Analog input 2 –
3	Analog input 3 –
4	GND
5	Analog input 4 –
6	N.C.
7	N.C.
8	N.C.
9	N.C.
10	GND
11	Analog output 1 –
12	Analog output 2 –
13	Analog output 3 –
14	Analog output 4 –
15	N.C.
16	N.C.
17	N.C.
18	N.C.
19	GND

Pinout	Signal
20	Analog input 1 +
21	Analog input 2 +
22	Analog input 3 +
23	Analog input 4 +
24	N.C.
25	N.C.
26	GND
27	N.C.
28	N.C.
29	Analog output 1 +
30	Analog output 2 +
31	Analog output 3 +
32	Analog output 4 +
33	N.C.
34	N.C.
35	N.C.
36	N.C.
37	GND

Figure B-2. XGA OUT 15-pin, Female, D-sub Connector

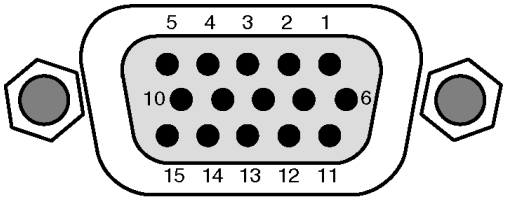


Table B-2. XGA OUT Connector Pinouts

Pinout	Signal
1	XGA red output
2	XGA green output
3	XGA blue output
4	N.C.
5	GND
6	GND
7	GND
8	GND

Pinout	Signal
9	N.C.
10	GND
11	N.C.
12	N.C./SDA
13	XGA horizontal sync output
14	XGA vertical sync output
15	N.C./SCL

Figure B-3. GPI/TALLY Connector

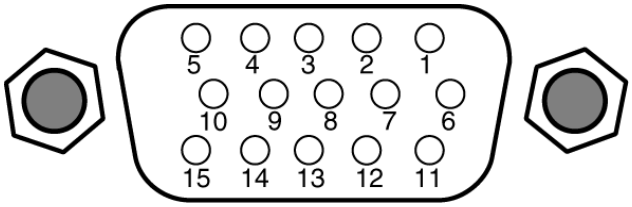


Figure B-4. GPI/TALLY Breakout Board

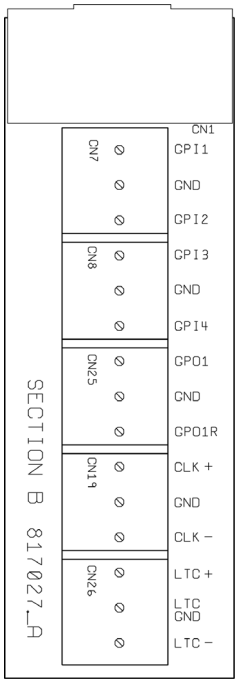


Table B-3. Pinouts for GPI/TALLY Connector and GPI/TALLY Breakout Board

Pinout	Signal
1	ERROR SUM
2	Select input A
3	Select input B
4	Select input C
5	Select input D
6	ERROR SUM RETURN
7	GND
8	GND

Pinout	Signal
9	LTC GND
10	LTC+
11	LTC-
12	CLK+ (Clock +)
13	CLK GND
14	CLK -
15	GND

Figure B-5. Remote RJ-11 Control Connector

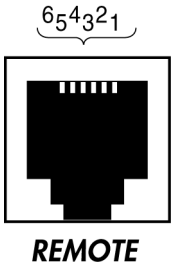


Table B-4. Remote RJ-11 Control Connector Pinouts

Pinout	Signal	VTM-2000	RCU-2000
1	OPEN	Open	GND
2	RX -	Received by VTM-2000	Transmit from RCU
3	RX +	Received by VTM-2000	Transmit from RCU
4	TX -	Transmit from VTM-2000	Received by RCU
5	TX +	Transmit from VTM-2000	Received by RCU
6	GND	GND	GND

Figure B-6. VFlash RJ-45 Connector

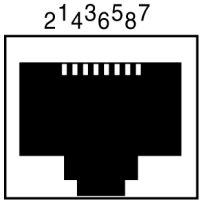


Table B-5. VFlash RJ-45 Connector Pinouts

Pinout	Signal
1	TX+
2	TX-
3	RX+
4	N.C.

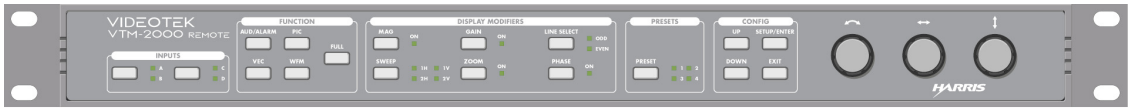
Pinout	Signal
5	N.C.
6	RX-
7	N.C.
8	N.C.

Appendix C ♦ RCU-2000 Remote Control Unit

The RCU-2000 remote control unit enables remote control of as many as 30 VTM-2000s.

Installing the RCU-2000

Figure C-1. RCU- 2000 Front and Back Panel Views



Front View

Back View

Table C-1. Description of RCU-2000 Back Panel Connectors

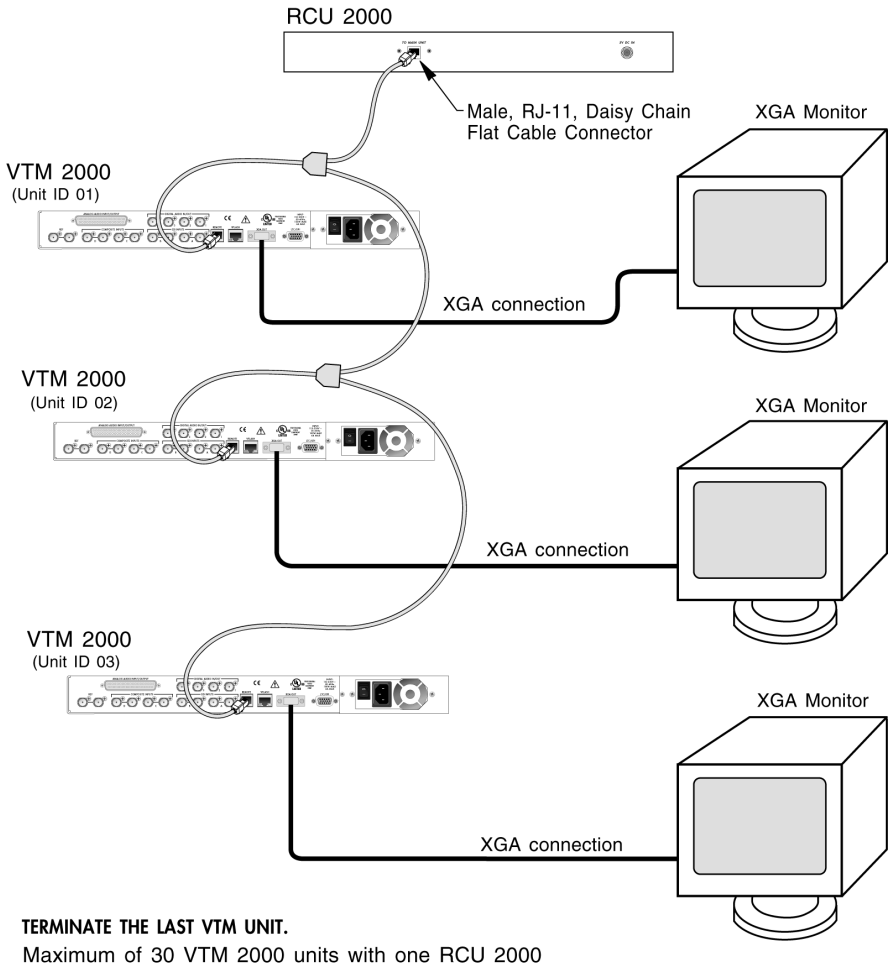
Label	Description
TO MAIN UNIT	RJ11 connector that connects to the REMOTE connector on the VTM-2000 and provides communication. The communication parameters are 8 data bits, no parity, with the baud rate fixed at 38,400 bps.
5V DC IN	Connects to the DC power plug on the RCU-2000 power supply. A knurled ring enables the power plug to be secured to the jack after the plug is fully inserted. This connection must be made before AC power is supplied.

To install the RCU-2000:

1. Connect the DC power supply to the 5V DC IN connector.
2. Connect the power cord to a properly grounded AC outlet.
3. Verify that the front panel buttons flash. If they do not, check steps 1 and 2.
4. If multiple VTM-2000 instruments are being connected, ensure each VTM-2000 has a unique unit ID (from 1-99) before connecting them to the REMOTE bus. The UNIT ID submenu is located in the COMMUNICATIONS menu. See Unit ID on page 4-19 for more information on Unit ID.
5. Physically connect the RCU-2000 to a bus with one or more VTM-2000 instruments using a multidrop cabling adaptor and straight through cable using RJ-11 connectors (not a standard telephone wire) that connects to the REMOTE ports on the back of the VTM-2000 instruments and to the TO MAIN UNIT

connector on the back of the RCU, as illustrated in **Figure C-2**. The RCU-2000 must be at one end of the RS-422 bus. The last VTM-2000 instrument must be terminated at the other end by selecting TERMINATION in the COMMUNICATIONS\RCU PORT menu.

Figure C-2. Connecting the RCU to Multiple VTM-2000



6. Once connected, select the VTM-2000 instrument to be controlled by the RCU-2000 by pressing and holding the SETUP and EXIT buttons simultaneously on the RCU-2000 simultaneously. While in the selection mode, the PHASE LED flashes.
7. Rotate the CURVED ARROW knob to search up or down from the last found Unit ID to select the instrument to be controlled. The Line Select LEDs will alternately flash until a VTM-2000 is found.
8. When communication is established between the RCU-2000 and the VTM-2000 instrument, the RCU-2000 LINE SELECT LEDs will stop flashing in alternate pairs. The RCU-2000 LEDs now reflect the settings of the attached VTM-2000 instrument. The RCU-2000 front panel operations affect the VTM-2000 instrument.

9. The VTM-2000 polls the selected RCU-2000 every five seconds. If the VTM-2000 instrument fails to receive the poll after 60 seconds, the RCU-2000 assumes that a communication break has occurred.
   The LEDs flashing indicates a communication break. When communication is once again established, the LEDs will reflect the current setting.

Operating the RCU-2000

Operating the RCU-2000 is the same as operating a VTM-2000 instrument with one exception: selecting a VTM-2000 instrument for communication.

To select a VTM-2000 instrument for communication:

1. Press and hold the SETUP and EXIT buttons simultaneously to enable the selection mode. The Phase LEDs flashes.
2. Rotate the CURVED ARROW knob to search for a Unit ID. Rotating clockwise scans UP through the UNIT IDs. Rotating counterclockwise scans down through the unit IDs.

Troubleshooting

Table C-2. RCU-2000: Problems, Causes, and Solutions

Problem/Symptom	Possible Cause	Solution or Explanation
The LEDs are not illuminated.	The DC power supply cable is not properly connected to the back panel 5V DC IN connector.	Properly connect the DC power supply.
	The DC power supply has no AC power applied.	Apply the AC power.
Bottom Row LEDs are flashing.	The RJ-11 cable from the VTM-2000 instrument to the RCU-2000 is defective or not properly connected.	Check the cable and the connection.
	VTM-2000 instrument not powered up.	Apply the power to the VTM-2000 instrument.
	A VTM-2000 instrument is not selected.	Select a VTM-2000 instrument.

If the problem still exists after troubleshooting the RCU-2000, see Section 1, “Service Support,” for further instructions.

Specifications

Power Requirements (External Power Supply)

AC power source 115–230 VAC, 50/60 Hz nominal

Power consumption 30 VA maximum

DC output 5 V

Mechanical

Dimensions

- Height: 1.75" (4.45 cm)
- Width: 19.00" (48.26 cm)
- Depth: 2.9" (7.36 cm)

Weight 2.3 lb (1.04 kg)

Environmental

Operating temperature 0° to +50°C

Storage temperature -40° to +65°C

Humidity 0 to 90% (non-condensing)

Altitude

- Operating: to 10,000 feet (3,050 meters)
- Non-operating: to 50,000 feet (15,240 meters)

Transportation 24" (9.5 cm) impact-drop survivable in original factory packaging

Standard Accessories

Standard accessories

- DC power supply (115–230 VAC, 50–60 Hz capability) with detachable AC power cord
- 25' RCU 2000 RJ-11 interface cable

Specifications are subject to change without notice.

Pinouts

Figure C-3. RCU-2000 TO MAIN UNIT RJ-11 Connector

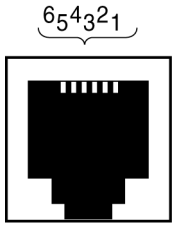


Table C-3. Pinouts for RCU-2000 TO MAIN UNIT Connector

Pinout	Signal
1	GND
2	Transmit from RCU
3	Transmit from RCU
4	Received by RCU
5	Received by RCU
6	GND

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Appendix D ♦ Glossary

601 An international standard (ITU-R BT.601) for component digital television. It defines the sampling systems, matrix values, and filter characteristics for digital television.

8 VSB Vestigial sideband modulation with 8 discrete amplitude levels.

16 VSB Vestigial sideband modulation with 16 discrete amplitude levels.

Advanced Television Systems Committee (ATSC) The parent organization that developed, tested and described the form and function of the US digital television formats.

AES/EBU A digital audio standard established jointly by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).

Artifacts Unwanted visible effects in the picture created by disturbances in the transmission or image processing, such as edge crawl or 'hanging dots' in analog pictures or 'pixelation' in digital pictures.

Aspect Ratio The ratio of horizontal to vertical dimensions. A square has an aspect of 1:1 since the horizontal and vertical measurements are always equal. Current television screen aspect ratios are 4:3 and 16:9.

Asynchronous Serial Interface (ASI) A transmission method adopted by the DVB, and called DVB-ASI. The transmission method allows for the transport of varying data payloads in a constant data stream. The DVB-ASI transport stream rate is 270 Mb/s.

Audio Breakaway Routing video and accompanying audio in separate signal paths.

Audio-Follow Routing video and accompanying audio together in the same signal path.

Auto Trans Automatic transition. The execution of a single wipe or fade from current picture to another picture by way of an automatic device.

Bandwidth The range of frequencies used to transmit information such as picture and sound.

Baseband Video An unmodulated video signal.

Black Also color black, blackburst. A composite color video signal that has the composite sync, reference burst, and a black video signal.

Blanking Processor A circuit which removes sync, burst and blanking from the program video and then replaces it with sync, burst and blanking from the reference input. The process ensures constant sync and burst levels on program video.

Border An electronically-generated picture member which is used in wipes to separate the two video sources used in the wipe. It is of even thickness and has color produced by the matte generator.

Broadcast Legal Encoding video signal parameters to conform to prescribed limits for broadcast. Encoding rules vary by NTSC, PAL, country and broadcast facility.

BTSC Broadcast Television Standards Committee. A US standard for stereo audio encoding in NTSC broadcast television.

CAV Component Analog Video

CES Consecutive Errored Samples

Composite Video A single video signal that includes all color video and timing information. A composite signal includes luminance, chrominance, blanking pulses, sync pulses and color burst information.

Chrominance The color portion of a video signal that represents the saturation and hue. Black, gray and white have no chrominance; color signals have both chrominance and luminance.

CH Chroma

Chrominance/Luminance Delay (C/L Delay) A measurement that indicates the amount to which chrominance and luminance are aligned with respect to each other. A low C/L delay figure can minimize the effects of ghosts or color offset on the received picture.

Clipping The electronic process of shearing off the peaks of either the white or black excursions of a video signal for limiting purposes. Clipping is often performed prior to modulation to limit the signal.

CMRR Common Mode Rejection Ratio

Color Burst The portion of a color video signal which contains a short sample of the color subcarrier. It is used as a color synchronization signal to establish a reference for the color information following it and is used by a color monitor to decode the color portion of a video signal. The color burst acts as both amplitude and phase reference for color hue and intensity. The color oscillator of a color television receiver is phase locked to the color burst.

Composite Sync A signal consisting of horizontal sync pulses, vertical sync pulses and equalizing pulses only.

CRC Cyclical Redundancy Check

Crosspoint An electronic switch, usually controlled by a button on the panel. Control logic will allow for only one crosspoint, for each bus, to be switched "ON" on at a time.

D/A Conversion of digital to analog signals.

DA Distribution Amplifier

Data Element An item of data as represented before encoding and after decoding.

Decoded Stream The decoded reconstruction of a compressed bit stream.

Decibel (dB) A logarithmic measure of the ratio between two powers, voltages, currents, sound intensities, etc. Signal-to-noise ratios are expressed in decibels.

Default A factory preset value or condition.

Demodulator A receiver, such as for television broadcast, cable, and closed circuit applications. A TV demodulator receives and processes off-air or cable RF signals and provides baseband video and audio outputs.

DHCP Dynamic Host Configuration Protocol

Differential Gain A measurement that specifies how much the chrominance gain is affected by the luminance level. Expressed as a percentage showing the largest amplitude change between any two levels, it indicates how much color saturation variance occurs when the luminance level changes.

Differential Phase A peak-to-peak measurement that specifies the extent to which the chrominance phase is affected by the luminance level. Expressed in degrees of subcarrier phase, it indicates how much hue shift occurs with luminance level changes.

Digital Video Broadcasting (DVB) A specific project office of the European Broadcast Union. This group has produced a set of digital broadcasting standards.

DSK Down Stream Key, a keyer which is electronically located after (or down stream from) all other functions of a switcher. The key resulting will appear to be on top of all other pictures from the switcher.

D-VITC Digital Vertical Interval Time Code. Timecode information stored on specific lines in the vertical blanking interval of a television signal.

EAV End of Active Video in component digital systems.

EBU European Broadcasting Union

Editor A device or system which controls video tape recorders, video switchers, and other related devices in order to electronically splice segments of recorded video into a finished production.

EDH Error Detection and Handling. A recommended practice defined in SMPTE RP 165. A system to generate and then detect video data errors in serial digital video systems.

Effects Keyer A keyer which is electronically located in the mix/wipe generator portion of a switcher. The resulting key would appear under the down stream key.

EIA Rack Space or Unit A specific size as designated by the Electronics Industry Association. The rack unit is 19 inches wide, and is 1.75 inches tall. A device which requires 3 EIA rack units is 19 inches wide and 5.25 inches (3x1.75 = 5.25) tall.

Elementary Stream (ES) A generic term for one of the coded video, audio or other variable length bit streams which are packetized to form MPEG-2 transport streams. Consists of compressed data from a single source (audio, video, data, etc.). One elementary stream is carried in a sequence of PES packets with one and only one stream ID.

Embedded Audio Digital audio information multiplexed onto a serial digital data stream. Up to sixteen channels can be multiplexed on a single stream of 601 video, minimizing cabling and routing requirement.

ENG Electronic News Gathering

Encoded Clip Softness In the encoded legalization process, "softness," as applied to encoded clips, refers to the processing of the video at the point of the clip. The clips are applied in YC_BC_R color space. The clip point is either an immediate limit (no softness) or will have a range of values leading to the clip point, all reduced to smooth the clip point to a less immediate limit (softness).

Encoded Legalization Limiting of the luminance and color difference signals such that, once encoded into a composite video signal, the resultant encoded video does not violate the maximum or minimum signal levels as defined by the specific encoding rules. NTSC and PAL video plus various users of these types of video have many varied rules for maximum and minimum encoding limits. Encoded legalization usually calculates first the encoded luminance value and then the corresponding chroma value to make legalization judgements.

Encoded Video A combined single video signal that is constructed from either separate RGB or luminance and two color difference video signals. NTSC, PAL, and SECAM are all examples of encoded video.

Envelope Detection An RF signal detection technique that does not respond to phase variations in the carrier signal, enabling measurement of a transmitter's incidental phase. When used together with synchronous detection, envelope detection helps isolate either video and/or RF as the causes of phase distortion.

External Key Input This is an alternate source for key cut. This is usually a separate external input to a switcher

Fade-thru-Black A production technique which is a two step process. The first step will fade the program video to black. The second step will fade from black to the video selected on the preview bus. This is usually used in major scene transitions.

Fade-to-Black A production technique which simply fades the program video to black and program audio to silent. This is used to end programs and to escape from embarrassing pictures or sounds.

Field A picture or picture portion which is produced within one cycle of vertical synchronization. In interlaced systems, a full picture or frame requires two consecutive fields.

FM Trap A circuit designed to minimize potential interference from strong FM signals in receiving equipment, such as a TV demodulator. For example, an FM trap can attenuate signals between 88-108 MHz to reduce interference on NTSC television channel 6.

Frame A single full resolution picture as viewed in either a video or film system. In the case of interlaced video, two consecutive fields provide all of the information of one frame. In non-interlaced systems, one cycle of vertical synchronization produces a frame. A 60 Hz interlaced system, produces 30 frames of video in one second. A 60 Hz progressive (or non-interlaced) system, produces 60 frames of video in one second. Common frame rates are 24 (film) 25, 29.97, 30, 50, 59.94 and 60.

Frame Synchronizer An electronic device that synchronizes two or more video signals. Using one input as a reference, it locks a second signal to the reference.

Frame Store An electronic method of capturing and storing a single frame of video.

Gamma This term applies to the linearity of the change from black to white. Gamma controls adjust the gray or 50% point of the video either up or down, with the effect of changing the gray level of the video.

Gamut The whole or total of whatever is being addressed. In color space, gamut refers to all colors which are included in a particularly defined color group, such as 601 gamut.

Genlock (Generator Lock) A method of synchronization involving the generation of a video signal that is time and phase locked with another signal.

GPI General Purpose Interface

Headend In a cable TV system, the facilities where program sources (satellite, terrestrial, VTR, local) are received and remodulated for distribution through a cable plant.

High Definition Television (HDTV) High definition television has a resolution of approximately twice that of conventional television in both the horizontal (H) and vertical (V) dimensions and a picture aspect ratio (H to V) of 16:9.

High Level A range of allowed picture parameters defined by the MPEG-2 video coding specification which corresponds to high definition television.

HRC Harmonically-Related Carrier

Hue Color tint

ICPM Incidental Carrier Phase Modulation. A measurement of picture carrier phase distortion (affected by the video signal level) that occurs in the transmitter.

IP Internet Protocol

IRC Incrementally-Related Carrier

I.R.E. Refers to the Institute of Radio Engineers, and is used as a unit of measurement. In NTSC television, 1 volt of signal equals 140 IRE units.

ISP Internet Service Provider

Jitter A deformation of a signal affected by poor synchronization.

Key An effect in television where a selected portion of background video is removed and replaced with another video.

Key Cut In a key effect, this is the video which designates the portion of background video which is removed.

Key Fill In a key effect, this is the video which is used to replace the portion of background video which was removed. This may be the same video as the Key Cut video.

Key Invert In a key effect, this is an electronic action which reverses the polarity of the key cut signal. It makes black appear as white, and white appear as black.

Key Mask In a key effect, it uses a wipe pattern from the wipe pattern generator to restrict the key cut from removing video in a portion of the screen. This requires the use of the wipe pattern generator and the Mask/Preset Size controls.

Key Source Another term which is the same as key cut.

Legalization The modification of serial digital video to conform to analog color space rules, as required by users.

LCD Liquid Crystal Display

LED Light-Emitting Diode

LFE Low Frequency Effects

Lissajous A display of the amplitude and phase relationships between two input signals.

LS Left Surround

LTC Longitudinal Time Code, A SMPTE timecode standard usually recorded onto the linear audio track of a VTR.

Luminance The degree of brightness (black and white portion of the video signal) at any given point in the video image. A video signal is comprised of luminance, chrominance and sync. If luminance is high, the picture is bright and if low the picture is dark. Changing the chrominance does not affect the brightness of the picture.

Main Level A range of allowed picture parameters defined by the MPEG-2 video coding specification with maximum resolution equivalent to standard definition television.

Main Profile A subset of the syntax of the MPEG-2 video coding specification that is supported over a large range of applications. Applications include, MP@HL (Main profile at high level) and MP@ML (Main profile at main level).

Mask/Preset Size Uses the wipe pattern generator in the keyer portion of the effects generator. This is used to adjust the size of a preset pattern or for adjusting the size of a mask to block a portion of the key cut (source) from use in the keyer.

Matte Generator An internal generator which can make any color, is used for border color and may be used for key fill. It is identical to the Color Background Generator, but simply used in other areas of the switcher.

Mbps Megabits Per Second

mV Millivolts

M/E Mix/Effects System

MP@HL Main profile at high level

MP@ML Main profile at main level

MPEG Refers to standards developed by the ISO/IEC JTC1/SC29 WG11, Moving Picture Experts Group.

MPEG-2 Refers to ISO/IEC standards 13818-1 (Systems), 13818-2 (Video), 13818-3 (Audio), and 13818-4 (Compliance).

Multi-Level Effects Applies to any effects generator which can do more than one effect at a time. Typically, a multi level switcher can produce a Key and a Background transition in the same effects generator at one time.

NTSC National Television Systems Committee, the color television system used in the United States, Canada, Mexico and Japan.

NVRAM Nonvolatile RAM

Packet Identifier (PID) A unique integer value used to associate elementary streams of a program in a single or multi-program transport stream.

Packet A packet consists of a header followed by a number of contiguous bytes from an elementary data stream. It is a layer in the system coding syntax.

Packetized Elementary Stream (PES) The data structure used to carry elementary stream data. The packets consist of a header followed by payload data, and a stream is a series of packets which form an elementary stream and have a single stream identification.

PAL Phase Alternation Line; the standard color television system in many European and other countries.

Passive Looping Video and audio signals routed through components, even if power is removed. Signals are not amplified or processed, maintaining transparency.

Pedestal Level An offset used in a video system to separate the active video from the blanking level by maintaining the black level above the blanking level by a small amount.

Pixel A Picture cell or Picture element representing one sample of picture information, such as an individual sample of R, G, B, luminance or chrominance.

Preset Refers to establishing any condition prior to use on the Program output. This term is used in reference to wipe patterns and is often interchanged with Preview.

Preview The video output channel used to view the intended Program results prior to the execution of the next transition.

PRO Audio A transmitted audio channel for talent cueing via Interrupt Foldback (IFB) to ENG vans and remote applications. Some demodulators support PRO audio monitoring.

Program A transport stream combination of a video stream and one or more audio and data streams associated with that video stream. In analog terms, “Program” refers to the Base Band video and audio produced by the final output of a switcher.

Program Association Table (PAT) A list of all programs that are in the ATSC data stream.

Program Map Table (PMT) A listing of all elementary streams that comprise a complete (television) program.

Program Clock Reference (PCR) This is a time reference signal that is placed in MPEG streams for the purpose of time coordinating various data streams.

Program and System Information Protocol (PSIP) Information sent out as part of an ATSC transport stream which lists all of the video, audio, data and program information contained in the stream. This is the "TV guide" for a given stream.

Progressive Scanning Also non-interlaced. A system of video scanning where lines of a picture are transmitted consecutively, such as with VGA monitor displays.

Push-push Toggle Switch An electro-mechanical device which, when pushed, alternates the condition of the switch. Push once, it's off, push again, it's on.

Quadrature Output An output in a television demodulator used for measuring Incidental Carrier Phase Modulation (ICPM) in a transmitter.

QPSK Quadrature Phase Shift Keying, typically used by satellite downlinks.

QAM Quadrature Amplitude Modulation, the technique used by cable TV systems (64-QAM and 256-QAM) to remodulate signals for distribution in a cable plant.

RGB Legalization Limiting of luminance and color difference video signals such that, once transcoded into RGB component video signals, the resultant video does not violate the maximum or minimum signal levels as defined by component video level rules. Typically, the maximum value for R, G, or B is 700 mV, and the absolute minimum value for any of these signals is 0 mV.

Reclocking The process of regenerating digital data with a clock recovered from the input data.

Resolution A measure of the finest detail that can be seen, or resolved, in a reproduced image.

RS Right Surround

RS-422 Recommended Standard number 422, an E.I.A. standard which describes a type of data interchange. Television products use this standard as its communication format between the electronics frame and editors, control panel and computers. An RS-422 line may be extended up to 1,000 feet (304m).

Sampling Process by which an analog signal is sampled to convert the analog signal to digital.

SAP Secondary Audio Program, used in television broadcast for second language broadcasting, simulcasting, and separate audio programming.

Saturation Color intensity

SAW Filter Surface Acoustic Wave filter

Segment Error Rate (SER) A calculated average of uncorrected transport stream packets vs. total packets as accumulated over a designated period of time.

Signal to Noise Ratio -Analog (SNR) A measurement of the noise level in a signal expressed in dB (decibels) as a ratio of between the audio or video signal’s maximum peak-to-peak signal voltage and the measured voltage of noise present when the signal is removed. Higher SNR figures indicate that any noise introduced by system components will not be perceived in the picture and sound output signals.

Signal to Noise Ratio-8VSB (SNR) As applies to 8VSB transmissions, this is a calculated average power of the ideal signal divided by the actual demodulated signal power.

SMPTE Society of Motion Picture and Television Engineers

Standard Definition Television (SDTV) This term is used to signify a digital television system in which the quality is approximately equivalent to that of NTSC. This equivalent quality may be achieved from pictures originated at the 4:2:2 level of ITU-R BT.601 and subjected to processing as part of the bit rate compression. The results should be such that when judged across a representative sample of program material, subjective equivalence with NTSC is achieved. The displayed picture may be either the traditional 4:3 or the wide-screen 16:9 aspect ratio.

STL Studio Transmitter Link

Synchronous Detection A common detection technique used in television demodulators that removes quadrature distortion, enabling comparison of transmitter output with video input signal.

S-Video Also Y/C. Transmits luminance and color portions separately via multiple wires, thus avoiding the color encoding process and resulting loss of picture quality.

Tally A system used to light lamps and indicate usage. Most production switchers have an internal tally system to indicate selected functions, and which selected functions are currently involved with Program.

TCP Transmission Control Protocol

Telecine A device used to convert film to video; movie film is digitally sampled and converted to video frame by frame in real-time.

TCXO Temperature Compensated Crystal Oscillator

THD Total Harmonic Distortion

Transport Stream-ATSC (TS) Consists of the following: (1) Packets: 188 bytes - fixed length with descriptive data, (2) Carries several programs, (3) has a PID which identifies the type of TS packet (video, audio, other), and (4) carries descriptive information about the program.

UHF Ultra High Frequency

Unity Gain An electronic term indicating that a signal will be neither amplified or attenuated. One volt of signal level in results in one volt of signal level out.

Vector A measure that has two individual properties: magnitude and direction.

Vector Clip A special encoded clip version that limits only the C_B and C_R input video signals and does not affect (nor is it affected by) the luminance component. This color-only clip limits the maximum vector excursions as viewed in an encoded state and is intended for users who wish to prevent encoded vectors from ever exceeding the perimeter circle of an encoded vector display.

VHF Very High Frequency

VITC Vertical Interval Time Code, a method for recording on to video tape the timecode address for each video frame inserted in the vertical interval.

Waveform A visual representation of a signal in the shape of a wave that plots amplitude versus time.

White Level The brightest part of a video signal, corresponding to approximately 1.0 Volt.

White Balance An electronic process used to calibrate the picture for accurate color display in different lighting conditions.

Wipe A special effect in which two pictures from different video sources are displayed on one screen. Production switchers and special effects generators provide numerous wipe patterns varying from simple horizontal and vertical wipes to multi-shaped, multi-colored arrangements.

XGA High resolution 1024x768 non-interlaced (progressive) display monitor

XVGA Extended Video Graphics Adaptor

YP_BP_R: CAV format composed of luminance (Y) and two color difference signals (P_B and P_R)

Y/C Also S-video. Describes the separation of video signal luminance and chrominance components.

Zero Carrier Pulse (chopper) In a TV demodulator, removes the carrier in the vertical interval for a short period, enabling depth of field measurement.

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